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ANNUAL REPORT

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OF THE INSTITUTE

Department of Agriculture

FOR THE

Year Ended 31st March, 1944

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ANNUAL REPORT OF THE DEPARTMENT OF AGRICULTURE

FOR THE YEAR ENDED 31st MARCH, 1944

SECTION I—AGRICULTURE IN THE COLONY

The general development of agriculture in the Colony during the year has necessarily been much affected by war conditions. The major influencing factors were the necessity for maintaining supplies of locally grown food and the marketing restrictions on export crops brought about by war conditions. On the whole, and considering the effects the war might have had, conditions were exceptionally normal. The market conditions in regard to the three major crops particularly assisted in maintaining the situation. The restriction of sugar production was modified during the year and Jamaica permitted to manufacture a quantity of sugar up to 20% over her recent sugar production. The Imperial Government continued to purchase all bananas of marketable quality produced which not only assisted the banana grower but also afforded considerable help to the local food situation. A demand from the United Kingdom for citrus pulp provided an outlet for a considerable proportion of the citrus crop.

2. The general situation in regard to crop production has been affected materially by the increase in the cost of living followed by increases in the cost of labour. The value of reliable statistics in regard to cost of production and general farm economics has been amply demonstrated when problems relating wages to costs and receipts have come to the fore. The attempts to solve such problems have adequately demonstrated the paucity of such statistics in Jamaica. A primary step has been made, however, during the year in taking, for the first time, an agricultural census of Jamaica. The Census Officer and his staff collaborated to the full with the Agricultural Services with a view to determining a satisfactory system of questions whereby information of value and accuracy could be elucidated. It has not been possible to compile all the agricultural returns during the year under consideration but there is little doubt that information obtained will be of fundamental value to Jamaican agriculture as a whole. That value will be increased immeasurably as further agricultural censuses are taken.

3. Two basic steps for determining statistics related to the economics of agricultural industry have been taken in the appointment of a Sugar Industry Commission and of a Committee to investigate the cost of production of food crops.

4. An important development in agriculture is a genuine appreciation by farmers of all types and classes that it is essential for some system of farming to be developed which is on a more permanent basis than that of the past system of one crop cultivation. The establishment of such a system is slow but is being greatly stimulated by the unlimited market for milk which the presence of the Condensery in the Island provides.

5. A further valuable contribution to the study of agricultural conditions in Jamaica has been an assessment of the national income of Jamaica made by Dr. F. Benham, Economic Adviser to the Comptroller. His estimate of the gross income from agricultural products in Jamaica is £10,000,000.

6. The importance of soil conservation has been emphasised by the appointment of a Soil Conservation Committee which should provide for full co-operation and understanding between the Government Departments concerned with the utilisation of land. This Committee should provide the means whereby soil conservation measures can be placed on a regional basis. The fortuitous relationship between the development of a dairy industry and the establishment of soil conservation measures has and will prove of great advantage.

7. Another factor on which the development of a stable farming system is dependent is the tenancy system and considerable attention has been given to the development of a suitable system of agricultural tenancy for Jamaica.

8. A step towards formulating a long term agricultural policy has been made by the appointment of an Agricultural Policy Committee which will make recommendations to Government in regard to general policy and the method of implementing it. Much of that policy must however depend upon post war Imperial and International policy in regard to the marketing of tropical crops.

9. The favourable trend the war has taken has directed the thoughts of agriculturists in Jamaica to the preparations to enable Jamaica to enter into what may be strongly competitive markets in the post war era. It is very apparent that with few exceptions unless additional efficiency is attained Jamaica could compete with few other countries although her natural conditions for the production of many crops are most favourable.

10. It has been generally accepted that although the search for new crops with ready markets must be continued vigorously it would be unwise to neglect, in favour of such crops, work with those crops which are grown most easily in Jamaica and for which conditions in many cases are among the most favourable. Investigational work on sugar, banana, coffee, citrus, cacao together with local food crops has received priority.

11. With a view to placing Jamaica on a more favourable basis there has been an important move towards the organisation of producers into commodity associations. The producers in sugar industries have already organised themselves. An All-Island Jamaica Livestock Association has been formed. During the past year steps were taken to organise a Citrus Growers Association. A democratic constitution has been developed which will embrace all commercial growers of citrus. Experience in the past has amply demonstrated in Jamaica the necessity of some form of compulsion if such commodity associations are to work satisfactorily and to succeed in acting as marketing agents and, with that end in view, considerable attention has been given to drafting a Marketing Law which it is hoped when it becomes legislation will prevent a few uncooperative persons frustrating the desires of the major portion of an industry.

12. The necessity of co-ordinating the activities of the various Government Departments concerned directly or indirectly with agriculture and their approach to the general problems affecting agriculture in the Island has long been appreciated and a Land Policy, etc., Co-ordinating Committee was appointed for this purpose and has done valuable work. This Committee was used as an Advisory Committee to Government on general problems in agricultural policy.

13. It is unfortunate that the impossibility of obtaining trained staff during war time and, to some extent the difficulty in obtaining materials, has not permitted the Colony to take full advantage of the funds and schemes under the Colonial Development and Welfare Act in so far as agriculture is concerned.

14. With the somewhat depressed conditions in agriculture there has been a tendency for persons to drift from agricultural pursuits to the towns. Steps which have been taken in attempting to remedy this tendency have taken three main lines:—

(1) the individual who is independent and has some small funds available has been facilitated in obtaining land by the land settlement scheme and in their development by assistance through the Agricultural Loan Banks.

(2) the person who has had little agricultural training but has some aptitude for agriculture is being trained in the Agricultural Centres.

(3) schemes whereby to assist the farmer already established on his holding but who is unable to make the necessary capital expenditure to place his holding on an efficient basis have been formulated.

EXPORTS

15. The principal agricultural exports for the year 1943 are as follows.—

		Quantities	Value f.o.b.
Sugar and Rum			
Sugar	tons	140,527	£1,831,614
Rum	galls	412,667	462,371
Citrus and Citrus Products			
Oranges	boxes	75	34
Orange Oil	lbs.	2,000	1,213
Grapefruit	pkgs.	59	53
Lime Juice, raw	galls.	248	161
Limes	pkgs.	3	2
Citrus Pulp	lbs.	38,547,529	336,487
Coconuts and Coconut Products			
Coconuts	No.	27,015,200	177,907
Copra	lbs.	3,033,724	37,045
Coconut Oil	galls.	146,835	36,817
Lard	lbs.	998,576	40,289
Margarine	lbs.	1,310,022	45,076
Pimento	lbs.	5,061,824	236,500
Ginger	lbs.	2,518,651	124,535
Tobacco, Cigars	lbs.	156,762	120,673
Cocoa	lbs.	4,850,109	105,572
Dyewood Extracts	cwt.	32,958	96,369
Bananas	stems	288,953	47,278
Honey	lbs.	1,405,269	33,416
Hides and Goatskins			
Hides	No.	84	60
Goatskins	No.	208,350	17,297
Annatto	lbs.	814,128	10,053
Bitterwood	tons	7	14
Coffee	lbs.	4,193,631	113,031
			£3,873,917

16. The total value of exports of agricultural products as put out above shows an increase of approximately £160,000 over the previous year's exports. This is due principally to the larger quantities of coconuts and coconut products as well as sugar exported.

WEATHER

17. The weather during 1943, with the exception of heavy rains in April, was generally favourable to agriculture. With the exception of some heavy rain in April the rainfall was well distributed. In the early part of 1944 dry conditions prevailed and drought was experienced in the spring and early summer in most parts of the Island. The Island rainfall for 1943 was 80.80 inches, as compared to the last 70 years average of 77.12 inches.

SUGAR AND RUM

18. The sugar industry continued on the same footing as in 1942-43. The total sugar production for the 1943 crop was 165,669.7 tons The crop was purchased by the Imperial Government.

19. Considerable quantities of rum were manufactured and were sold. The majority of the purchases were stored in Jamaica pending the end of the war.

20. The cost of production of sugar increased and negotiations during the year between the producers and labour resulted in an increase in labour rates. The basis for determining rates were established for a period of three years.

21. There was a tendency for decrease in the supply of cane farmers' canes mainly owing to the high cost of transporting canes over long distances.

22. Arrangements were entered into for the establishment of a factory for the manufacture of yeast from molasses. The yeast promises to provide a valuable contribution to the nutrition of Jamaica both directly and indirectly through providing a concentrated food for stock.

23. Research work undertaken by the Sugar Research Organisation is proceeding satisfactorily. A new technique described as the "Micro-Plot Technique" has been partially worked out by the officers in charge of this scheme and there are indications that it may provide a valuable contribution to the study of nutrient requirements of sugar cane.

24. The Jamaican Association of Sugar Technologists has been active and for the first time held two functions during the year both of which were well attended.

25. New cane varieties produced at the British West Indies Central Cane Breeding Station in Barbados have now had time to become established and there is every prospect that they will result in increasing yields of cane and sugar materially in Jamaica.

BANANAS

26. The general policy in regard to bananas was continued. The Imperial Government purchased all bananas which were of export standard. Relatively small quantities were shipped and the remainder sold at a low price for local consumption. The price paid was recognised as being a subsistence rate with the objective of maintaining a nucleus for the re-establishment of the industry at the end of the war. Representations during the year resulted in the price being increased in order to meet the increased costs of labour.

27. Production tended to decline partly due to the fact that some growers were not prepared to maintain their fields on a subsistence basis and in other cases the production of food crops for local consumption was more profitable. The decrease was also due, to some extent, to an accumulation of leaf spot infection in certain areas which hithereto had relatively light infection as a result of which marketable fruit could be produced only with consistent spraying. A further factor was that little replanting of fields has been undertaken during the war and yields from the older fields were beginning to decline substantially.

28. The organisation of banana purchasing continued under Government control and emphasised the efficiency of having one organization rather than three responsible for the collection and purchase of bananas. The number of stems purchased in 1943 was 9,095,869.

29. The responsibility of ensuring that banana growers spray efficiently to control leaf spot disease has rested in two areas with local committees set up under the Banana Shipping Companies' Organization. In the remaining sections of the Island there has been no central authority although the three Supervisors employed by the respective companies have been placed in separate zones. The Banana Leaf Spot Control Board has issued equipment and in some cases materials through its committees or through the supervisors. At the majority of distribution depots however materials have been controlled by the Board. There have been little changes in the amount of spraying against leaf spot undertaken by the larger growers. There have been sporadic increases in activity among the smaller growers but there has been no permanent increase of major importance in the number spraying regularly. The total amount of material issued to growers during the year was approximately 690 tons of copper sulphate and 900 tons of lime. Approximately 1,300 units have been issued to growers.

PIMENTO

30. The industry continued on a stable basis and good prices were received. Disease has now restricted the production of pimento to defined areas. There is no indication however that planters are prepared to cultivate pimento in these areas on a plantation basis rather than the existing semi-wild basis.

CITRUS

31. The citrus crop was used in the production of pulp, oil and concentrated juice. The yield per tree as a result of good seasons was unusually high with the result that the orders received for citrus products could not absorb the full amount of production. Orders had therefore to be allocated among growers and considerable dissatisfaction arose. As a result it was decided to form a Citrus Growers' Association. Active preparations for the formation of such an association were sponsored by the Jamaica Agricultural Society.

32. The demand for citrus plants was small. It appeared that there was not a great interest in the production of citrus although there was considerable revival of interest towards the end of the year.

COFFEE

33. Considerable difficulties arose during the year in regard to the standard of coffee exported. New Coffee Purchasing Regulations were introduced with a view to ensuring that only coffee in good condition was purchased. Nevertheless unscrupulous growers found ways of circumventing regulations.

34. There were few organised central pulping stations except in the Blue Mountain area. There was little or no grading of coffee for export. In view of these conditions the Department of Commerce and Industries took steps to operate a central pulpery paying particular attention to the quality of coffee purchased and to the grading of the product before export. The results achieved were highly satisfactory and established confidence in the Coffee Rehabilitation Scheme which was formulated with a view to organising the coffee industry in areas of favourable conditions and to the general re-establishment of the coffee industry in Jamaica.

CACAO

35. The export of cacao for the year was 4,850,109 lbs. and the price obtained was slightly lower than that obtained in 1942.

36. Cacao is grown in Jamaica mainly in small pockets and there are no extended established plantations.

37. It is generally appreciated that future conditions for the cacao industry are favourable. High yielding strains have been received from Trinidad and as soon as they have been multiplied sufficiently and trials conducted it is proposed to encourage growers to establish these strains. Some larger planters have already proceeded with the planting of normal seedlings.

COCONUTS AND COCONUT PRODUCTS

38. Over 27,000,000 coconuts were exported and 146,000 gallons of coconut oil together with 3,000,000 odd lbs. of copra. In addition the local market was supplied with a very considerable proportion of its requirements of margarine, coconut oil and soap.

39. The price for export products was favourable. The local prices were stabilised.

40. There was no material extension of the industry although in many areas coconuts are being established through bananas as an insurance against loss of this crop by Panama Disease.

41. The Wilt Disease of coconuts continued to cause the loss of considerable numbers of palms in the north-western section of the Island. There was a tendency for it to spread eastward but a campaign for the introduction of preventative measures was organised and no further spread has been recorded.

42. The Department in consultation with the Coconut Marketing Board has prepared a Coconut Research Scheme. The scheme is however dependent upon obtaining suitable staff and for the first year its activities will be devoted to the study of the Wilt Disease. The scheme is being financed equally by the Coconut Marketing Board and by grants under Colonial Development and Welfare Act, 1940.

FOOD PRODUCTION

43. The Food Production Campaign has continued on the same lines as in 1942-43. It is apparent that there is unlikely to be any material increase in local food production unless very drastic action is taken. Adequate supplies of normal foodstuffs have been maintained, but it appears unlikely that any action other than large central plantings by Government will increase substantially the production of certain crops such as peanuts, peas and beans.

44. There has been a substantial increase in the production of rice although it is still far short of local requirements. The price obtained however has been within six to eight times as great as the pre-war price.

45. The compulsory planting of food crops under Defence Regulations has been modified to permit occupiers of land who do not wish to produce food themselves to permit tenants to plant on their behalf. The proportion of land required to be in food crops is 2% when undertaken by the occupier himself, 4% when lands are rented at a peppercorn rental and 8% when lands are rented at 10/- per acre per annum.

46. The local Food Production Committees have done excellent work in maintaining interest in the food production campaign.

RUBBER PRODUCTION

47. As a result of the world shortage of rubber a survey of the existing rubber trees in the Island was made and experimental tapping of Hevea rubber trees in the Island was carried out on a plantation planted about 40 years ago at Kendal, Troja. In co-operation with the Lands Department some 3,000 lbs. of this rubber was shipped.

48. Experimental tapping was also carried out on Castilloa rubber trees at Rosehall where there were about 2,000 trees. Yields were good—many trees yielding up to 6 lbs. of latex on the second tapping. Difficulties were encountered with coagulation but these were later overcome by using soap and water. A sample of approximately 200 lbs. has been prepared and shipped.

LIVESTOCK

49. Interest in the livestock industry was maintained. This is principally due to an increasing consumption of fresh milk in urban areas, particularly in Kingston, and to the effect of the Condensery in providing an outlet for a quantity very much above present production. The system of paying a uniform price throughout the Island provided the quantity supplied in any one area warrants collection has undoubtedly contributed to the general interest. The cooling plant which was established at Montpelier to the west end of the Island has not, however, received the supplies that were expected.

50. Several small schemes sponsored by the Jamaica Agricultural Society have, through the co-operation of the Condensery authorities by operating transport in the first instance for uneconomical quantities, brought relief to areas which were suffering acutely from the disappearance of the banana.

51. The production of milk supplied to the Condensery in 1943 was 3,401,114 quarts.

52. The need for having high yielding cows is more widely appreciated. The general standard of yield from cows owned by the smaller farmers is low, but the demand for cows of better quality exceeds the supply. Full use has been made of the majority of the Livestock Improvement Centres. There is an increasing interest on the part of larger dairy owners to import their own breeding sires now that transport conditions tend to be easier.

53. The Jamaica Livestock Association has become more firmly established and active. Application has been made and approval given for a grant from Development and Welfare Funds to assist it financially over the first few years.

54. The possibility of establishing a local bacon industry is under consideration and with that in view a number of Tamworth boars have been imported and been crossed with the Berkshires which are predominant. The appearance of the Tamworth is not yet acceptable to the local pig breeder and it will be some time before many will be persuaded to use them. It is unlikely that there will be much progress until the bacon industry is established and premiums can be given for pigs of this type.

55. No positive cases of anthrax were reported during the year, and only two positive cases of swine fever. Blackleg outbreaks were sporadic. There has been an apparent increase in tick infection. This is to some extent due to the extension of livestock keeping to persons without facilities for tick control. Some cases, where regular dipping has failed to control ticks, have been reported and are under investigation. The whole question of tick control both in regard to short term and long term policy is under discussion with the Jamaica Livestock Association.

56. Preliminary surveys in regard to the incidence of Contagious Abortion have indicated that, in certain sections of the Island at least, the incidence of this disease is heavy. The general survey which has been planned will form the basis of a general policy in regard to the disease.

AGRICULTURAL EDUCATION

57. The position of agriculture in the general education of Jamaica has been emphasised by the findings of the Committee set up for the purpose of making recommendations for the general educational policy in Jamaica under Dr. Kandel. Proposals which should stimulate interest in agriculture in all grades of education are under consideration. The removal and extension of the Jamaica School of Agriculture will give the opportunity to bring the functions of that school more closely into the general organisation of agricultural education.

58. The Practical Training Centres under the Education Department have progressed satisfactorily and the system of apprentice farmers has been modified to enable students leaving the Centres to spend a further two years on a farm under supervision before being established on their own holdings.

59. The scheme under which officers of various Departments related to agriculture and the Jamaica Agricultural Society could obtain scholarships to the Imperial College of Tropical Agriculture has come into operation during the year. Four officers were selected—three from the Department and one from the Jamaica Agricultural Society, who proceeded to Trinidad in September 1943. Provision has been made by a grant from Development and Welfare Funds for a total of 15 scholarships over a period of five years.

JAMAICA AGRICULTURAL SOCIETY

60. The Jamaica Agricultural Society has continued to undertake the extension work in agriculture during the year. The Society, as well as the Department, has suffered from shortage of trained and experienced personnel. Under the Development and Welfare Scheme provision is made for additional instructors and the complement increased by 10 per year over the next five years. Such provision has permitted the withdrawal of some of the officers of the Department who were seconded to the Society. The 4-H Club work has increased substantially and a total number of 192 clubs are now operating. The activities of the Society are fully recorded in the Annual Report of the Society.

AGRICULTURAL CENTRES

61. The operation of the Agricultural Centres has continued and there is little doubt that they are providing a valuable contribution to the Colony not only in the training of peasant agriculturists but also in providing general information on the commercial cultivation of crops. Development of the Centres along the lines originally proposed has been restricted owing to uncertainty in regard to the future finance.

SECTION II—WORK OF THE DEPARTMENT OF AGRICULTURE

1. INTRODUCTION

62. The form of the annual report of the Department of Agriculture has been modified somewhat. The reports from the various Technical Officers and Officers in charge of divisions have been abstracted and the subject matter grouped under the headings of crops, animal husbandry, development of farming systems and miscellaneous. In this way the whole of the work concerning any one of the major crops is collected and the work undertaken with a view to incorporating that crop in a farming system has been summarised separately.

63. The recommendations for the organisation and extension of the Department which have been approved by the Comptroller were planned in 1942 and implemented in the financial estimates of the Colony for the year 1943-44. The plans provided for the organisation of the Department on a divisional basis, the need for which had been recognised for some long time previously, and for the establishment of Agricultural Stations to enable officers to conduct experiments in the field. Hitherto, with the exception of Grove Place, whose function had been modified in recent years from that of a Stud Farm to incude that of an Experiment Station, the two small stations established in 1940 primarily for field work on bananas had provided the only means whereby field experimental work on crops could be undertaken drectly by the Department. Experimental work undertaken on private properties had over a long period, with few exceptions, proved unsatisfactory and costly. The plans provided for additional senior technical staff.

64. The Secretary of State approved a grant under the Colonial Development and Welfare Act, 1940, amounting to £525,000 to finance the extended activities of the Department and the Jamaica Agricultural Society over a period of five years commencing 1943-44. It was not possible to take advantage of the grant for two main reasons, firstly that approval of the estimates was not received until late in the financial year and, secondly, that no additional senior staff could be appointed until late in the year. The senior staff of the Department was no greater, with the exception of those appointed late in the year, than that available to it in 1939 although heavy additional responsibilities including work in regard to Food Production projects and Agricultural Centres had been assumed. The normal routine work of the Department only could be undertaken.

65. The financial provision for Departmental and the Society's activities in 1943-44 amounted to £173,161 as compared with £113,652 in 1942-43. The actual amount spent on the Department of Agriculture when allowance was made for increase in the salaries and wage rates for Civil Service and subordinate staff due to regrading was less than in the previous year.

66. Included for the first time in the Colony's Estimates was expenditure for the cost of the Hope Farm's operations amounting to approximately £12,000 per annum previously operated on a working account; an increased subvention to the Jamaca Agricultural Society of approximately £15,000, the subvention to the Jamaica Livestock Association Ltd. amounting to £3,450, cost of regrading Civil Service and subordinate staff amounting to £14,000 approximately. The total provision for the first time in estimates for services already in operation or for increases in subventions not operated by the Department amounted to approximately £44,000. The actual expenditure during the year was £130,989 or a net expenditure, when allowance is made for the items referred to above, of approximately £87,000, that is, less than the revised estimated amount of £109,047 in 1942-43.

2. CROPS

Banana

INTRODUCTION

67. The main work of the Department in relation to bananas has been directed towards the development of varieties resistant to Panama and Leaf Spot Diseases. In addition to breeding new varieties, field trials have been commenced on established varieties which are immune to Panama Disease although not to Leaf Spot Disease. It is calculated that even if a satisfactory marketable immune variety is bred immediately it will be some 10 years before any substantial quantity could be produced for export. The main interest in the immune varieties surrounds the development of the SAI, but trials have not progressed sufficiently to warrant any pronouncement as to its potentialities. The research work on the control of Leaf Spot Disease has been completed. The behaviour of the fungus under varying conditions has been studied and the results used for the development of a more economical system of spraying. The Banana Leaf Spot Control Division which was established in 1939 under a grant from Colonial Development Funds, and which was charged with the investigational work with Banana Leaf Spot and other aspects of banana production and the general administration of the distribution of materials and equipment to growers was absorbed into the Department at the beginning of the year. The two Agricultural Stations established under that scheme and their staff which had also been undertaking investigational work in food crops were regarded as Departmental stations as from the commencement of the year and the staff was also placed on the permanent establishment. The section of the Division dealing with micro-biological research and certain administrative duties was retained over the period of the year. Departmental officers continued to co-operate with the Banana Leaf Spot Control Board in making general observations to the extent of spraying and the efficiency of the control obtained. Simplified measures for the control of Panama Disease were continued in areas where the incidence of disease is not high.

BREEDING RESISTANT VARIETIES

68. *General.* Set of seed was not as good as in 1942, only 1.56 seeds per pollinated stem being obtained. Loss of pollinated fruit was small amounting to 6.4%, little of which was due to weather disturbances. 8,398 stems were pollinated yielding 8,007 seed and 2,100 seed germinated.

69. Panama Disease has made further inroads into Gros Michel breeding stocks and new areas have been planted, the total breeding acreage remaining approximately the same. Seedling nurseries have been extended to deal with the increased seedling output. One new large scale variety trial has been laid down.

70. *Breeding Lines* There have been no radical changes of breeding policy. In addition to established primary crosses, *M. nagensium* and an undescribed species from Burma (Tagwin 3) have been brought into use in crosses with Gros Michel. 300 stems of a variety of *M. Cavendishii* have failed to give seed when crossed with a number of wild diploid varieties.

71. Crossing F1 primary tetraploids has been continued to increase the size of F2 families, but no new seedlings of particular promise have been obtained from these crosses which are being deleted from the programme as sufficient data are accumulated. Of the 2,100 new seedlings raised, 1,447 are derived from crosses of this type while the remaining 653 are primary tetraploids from crosses of Gros Michel varieties with immune wild types.

72. 340 young seedlings died prior to planting out, 325 high polyploids have been discarded and 1,981 new seedlings have been established in the field. The first fruit of 980 new seedlings has been reaped and 80 preliminary selections have been made for further trial.

73. *Introductions* Suckers of abaca (*M. textilis*) imported from Puerto Rico failed to germinate. Seed of a new clone of *M. acuminata* (Long Tavoy) showing promise as a male parent has been received and germinated.

74. *Variety Trials* Seedling variety trials have been carried on into the second ratoon crop. The best varieties give a heavy yield of fruit of good grade, but short fingered. One new seedling trial has been laid down. Fertiliser trials of seedling varieties are being continued, but are still in preliminary stages. One such trial has been extended to incorporate certain standard varieties. Routine testing of seedling varieties for resistance to Panama Disease is being continued.

FERTILISER TRIALS

75. Two experiments with seedling varieties are in progress at Grove Place; (i) manurial trial to test the residual effect of manures previously applied to a Gros Michel fertiliser trial; (ii) fertiliser trial involving five varieties to compare varietal response to similar fertiliser application.

FIELD EXPERIMENTS WITH GROS MICHEL

76. Results of manurial experiments with the Gros Michel banana carried out at Newtown Farm Agricultural Station indicate that phosphate applied in conjunction with nitrogen shortened the growing period and gave significant increases in height, number of hands per bunch, weight and finger length.

77. The cultivation of the Gros Michel variety on a "commercial" five-acre plot at Grove Place Agricultural Station was abandoned owing to the impossibility of economic control of Leaf Spot. Adverse soil conditions are believed responsible.

78. Records on the defoliation experiment established at the Orange River Agricultural Station in the spring of 1943 were continued.

79. A pruning experiment was established at the same station in the spring of 1943 to determine to what extent yields will be affected by the rapidity of succession of followers, both when bananas are heavily manured and mulched and when they receive no special treatment.

FIELD EXPERIMENTS WITH OTHER VARIETIES

80. Large scale fertilizer-mulch trials laid out at the Orange River Agricultural Station in the spring of 1943 with Lacatan and Cavendish bananas were continued, but in both cases poor planting material, borer attacks and drought in the summer combined to make repeated supplying of gaps necessary, and in consequence, the reaping of the plant crop had not been completed by March, 1944. Records are being kept on growth rates, heights of plants, and on grades and weights of bunches, sizes of fingers and length of ripening period.

81. As the original spacing trail established with Gros Michel in 1942 at the same station had failed through the inroads of Panama Disease, a new trial was planted in the spring of 1944 with Lacatan bananas which are immune to the disease and produce plants nearly equal in size to Gros Michel.

DEVELOPMENT OF THE S.A1

82. As a result of the recommendations of a committee appointed in 1942, 5,384 suckers of the immune variety of banana S.A1 were handed over to Government in March 1943. It is estimated that from these 21,360 suckers are now available. Plots of S.A1 banana were established at Seaman's Valley Estate and Caenwood Estate in Portland respectively, 3 acres and 2½ acres in area. The soil of both plots was considered to be excellent for the production of Gros Michel. The Caenwood area was somewhat shaded with coconuts and the plots received normal cultivation. The growth at Seaman's Valley was moderately satisfactory but that at Caenwood was excellent. The fruit produced will in due course be used for cold storage trials. Plants on all the plots were severely hit by the drought, but about 50% of those located at Caenwood are shooting.

BANANA LEAF SPOT CONTROL

83. *Research* Study was made of the effect of climatic conditions, notably temperature, on the viability of conidia produced on spots in one locality throughout the year. The low night temperatures in the cooler months slow down the rate of development of the conidia to such an extent that they are not fully mature by the time the dew dries on the leaves in the morning. Viability was assessed by recording the mortality of the spores after being put on to the surface of a heart-leaf and left to germinate for a week. The viability of the spores is closely connected with the state of maturity of the conidia. The mortality was highest in the colder months. The rate of growth of the germ tubes was slightly retarded by the lower temperatures. This work has explained the reason for the regular seasonal fall of conidia infection in the winter months which does not become evident until the effect is noticeable on the comparatively healthy foliage in March or April.

84. Recent experiments, together with a detailed analysis of earlier records, have definitely proved that the rate at which spots appear on a leaf is directly proportional to the intensity of infection per unit area of leaf surface, a heavily infected part of a leaf forming the individual spots very much faster than one lightly infected. In the interpretation of records of disease intensity at any time of the year, it is essential to take into account that the amount of spotting on any one leaf is dependent upon the intensity of infection and the age of the leaf or, conversely, that when the age of a leaf is known the amount of spotting gives a direct indication of the intensity of infection at the time when the leaf opened. Seasonal fluctuations of disease intensity can therefore be calculated by comparing records of disease either on all the individual leaves of a few plants at any one time of the year or between leaves of similar age (position on plant) at different times of the year. The extent of latency in spot development is considered to be dependent on the amount of toxin secreted by the primary infection hyphae while developing intracellularly following after penetration of the stomata; the heavier the infection per unit area of leaf surface the greater is the quantity of toxin released and, therefore, the quicker the cells of the leaf tissues lose their power of resistance. Evidence of the existence of a toxin is shown by the yellowing of the leaf tissue around a leaf spot but not round a hole eaten out of the leaf by a caterpillar or by any other purely mechanical injury.

85. The main work of the year was connected with spraying trials carried out by growers on plots of 5 to 25 acres throughout the island with the object of demonstrating the basic principles of leaf spot control, namely, (1) the attainment of maximum control in the summer months upon which the standard of control in the winter months is dependent, owing to the inability of 3 or 4-weekly spraying to control ascospore infection satisfactorily and (2) the safest time of the year to forego spraying is in the coldest months of January and February. Records were taken of the spotting on the individual leaves of parents and followers separately in order to estimate fluctuation of infection in considerable detail. The trial plots could be divided into those showing definite evidence of out-of-season tip-spotting (ascospore infection) in August and those without such spotting. The latter were maintained under excellent control throughout the year, but as expected there was close correlation between the intensity of tip-spotting in August and the severity of this form of the disease in February, thus clearly demonstrating that 3 - 4 weekly spraying cycles are incapable of controlling ascospore infection satisfactorily. The effect of foregoing spraying cycles in January and February without any loss of control, together with the marked fall of infection which occurred as usual in unsprayed areas in those months demonstrated that these are the two safest months in which to cut down spraying costs. These trials afforded an excellent opportunity for a survey to be made of the different soils on which abnormal perithecial production occurred. There is no doubt that the abnormality is correlated with an unbalanced metabolism of the banana leaf caused by soil conditions adverse to the normal performance of the roots; some of these conditions are difficult to ameliorate but improvement of drainage can undoubtedly be beneficial in many instances.

86. A full technical account of the investigations carried out from 1940-1944 to study the aetiology of leaf spot with the object of finding out how much reduction in spraying is possible has been submitted for publication.

87. *Field Extension* In the western division the incidence of infection during the year behaved in the same manner as the previous year. The lowest period was from April to the end of May, increasing in intensity in June and reaching its highest point from December to March. Growers in certain areas who sprayed regularly obtained commercial control throughout the year. There were, however, some areas which did not respond to intensive spraying due to certain soil conditions conducive to out-of-season ascospore infection.

88. At Orange River Agricultural Station satisfactory control of the disease was maintained except for a short period in the autumn of 1943 when unusually heavy ascospore infection became apparent on all the three main varieties, namely, Gros Michel, Lacatan and Cavendish.

DISEASES (OTHER THAN LEAF SPOT)

89. *Panama Disease* Simplified control measures, as indicated in last year's report, were carried out by Agricultural Instructors among small farmers in those areas where they were considered worth while. The larger properties as a rule carry out anti-Panama Disease measures as a matter of routine.

90. *Leaf Speckle* The fungus causing the more diffuse type of 'speckling' and recorded at first as *Hormodendron musicola* has now been referred to the genus *Cladosporium* and named and described at the Imperial Mycological Institute as *C. musicola* sp. nov. Likewise the constantly associated epiphyte has been named and described as *Zygophiala jamaicensis* gen. nov., sp. nov., related to the genus *Zygosporium*.

PESTS

91. Investigations and experiments on the comparative susceptibility to the Weevil Borer (*Cosmopolites sordidus* Germar.) of the following varieties of plantains:—Maiden, Horse, Giant and Whitehouse and of the relative resistance of the Gros Michel, Lacatan, S.19 and Cavendish have been started by establishing on Agricultural Stations at Orange River and Newton Farm, nurseries from which adequate planting materials for experiments on the field scale will be obtained.

92. In the western parishes, the borer was reported to be on the increase, this resulting from damage caused by high winds during the month of October.

93. Requests for supplies of the predator, *Plaesius javanus* Er., to control Banana Borers, *Cosmopolites sordidus* Germar, were satisfied. On account of conditions created by the war, inadequate travelling facilities and neglect of fields where the predators had been established, collection of the predators for distribution is becoming increasingly difficult.

BANANA FIBRE

94. As a result of numerous inquiries preliminary investigations were made into the possibility of utilising banana fibre. Preliminary trials were undertaken with a special decorticating machine made available to the Department. Plans were laid for the establishment of large scale trials of wild varieties of *musae* which were thought to have fibre of suitable qualities. Some investigations had been undertaken in Trinidad. The results of these investigations were so unsatisfactory that it was decided not to proceed with the more extensive trials contemplated for Jamaica.

Citrus

FIELD EXPERIMENTS

95. The results obtained during the first eight years from manurial experiments with grapefruit carried out on tawny *terra rossa* soils at Grove Place indicate that the optimum manure is a single level application of nitrogen and potash. It produces an increase in weight of fruit of 549% over control, i.e., an average increase of 2.9 boxes per tree per annum which, over the period of the experiment amounts to a gross return of 1,000% on the capital invested in manures. The chemical quality of the fruit is significantly improved but the size tends to be coarser.

96. Manurial experiments with grapefruit on acid clays of inland basin alluvial origin at Wakefield showed during the first six years that in the absence of further statistical analysis, the treatments which have produced the greatest return on capital spent in manures are those containing nitrogen, phosphates and potash, the most economic being N1, P2, K1, which produces a greater gross increase in yield over control than any other three element mixture except N2, P2, K2. In three crops, N1, P2, K1 increased the yield of fruit per tree by 201% of control, i.e., by 5.2 boxes. In the third and most recent crop, whereas control trees gave 1.83 boxes per tree, N2 P2 K2 trees gave 4.88 boxes each.

97. Experiments were also undertaken on the nutrient composition of the juice of mature grapefruit as a guide to the fertilizer requirements of the crop. It was found that juice composition is very sensitive to potash and nitrogen manuring. Trees with 1,100 p.p.m K20 in the matured fruit juice are unlikely to respond to further manuring with potash, though they will indulge in the luxury consumption of this element. The nitrogen content of the juice is equally sensitive to potash and nitrogenous manuring—potash manures decreasing the nitrogen in the juice. Insufficient work has been done to draw further conclusions about this element. The work is being extended as the results to date have proven encouraging.

98. An investigation was made into the cultivation of citrus on degraded *terra rossa* soils in Saint James. The soils are extremely deficient in available potash and phosphates and are also deficient in nitrogen and drainage. Fertilizer applications have been suggested as well as lines for orchard cultivation, the latter designed to improve drainage, build up soil humus and enhance the depth and stability of the tilth layer.

99. A hillside area at Newton Farm Agricultural Station planted with fifty budded trees of the following varieties of citrus:—Tahiti Lime, Rough Lemon, Ortanique, Kumquat, Shaddock, Marsh Seedless, Cecily, Thompson Pink, Silver Cluster, Valencia, Hamilton, Parson Brown, Tangelo, Lambs Summer and Surprise Navel as a source of budwood supply, was platform terraced and inter-planted with various types of windbreak to test their relative merits.

DISEASES

100. Cases of abnormal Fruit Drop in the Cambridge Valley were associated with the combination of an unusually heavy crop borne on trees planted on a poor and 'shotty' soil and continuous rains at the time of ripening.

101. A form of Stylar End Rot affected the fruit on young Valencia orange trees in Upper Clarendon holding their crop during an unusually dry spell in the winter.

PESTS

102. Since citrus fruits are not being exported owing to war conditions most growers have neglected pest control.

103. In the manurial experimental citrus grove at Grove Place, regular spraying to eliminate scale insects together with systematic collection of slugs and of adults and egg masses of the citrus weevil (*Prepodes vittatus* L.) have been successful to the extent that no appreciable damage was caused and the manurial experiments were not impaired.

104. The Citrus Weevil was found doing damage in St. Elizabeth, St. Thomas, Clarendon, Manchester, Westmoreland, Hanover and St. James. Other pests which came under observation were the scale insects—*Chrysomphalus aonidum* L., *Coccus viridis* G., *Lepidosaphes beckii* Newn., *Selenaspidus articulatus* Morg. and the Citrus Black Fly, *Aleurocanthus woglumi* Ashby.

105. Mr. C. C. Williams, Chief Entomologist, Rothamstead Experiment Station, forwarded to the Entomological Division for identification, specimens of the Citrus Black Fly, *Aleurocanthus woglumi* Ashby, which he had collected in southern Ecuador.

106. At Newton Farm Agricultural Station Fiddler Beetle continued to be a source of trouble and planting of *Tephrosia candida* has helped to reduce the population of this pest.

CITRUS PULP

107. Standard iodine, caustic soda and sodium thio sulphate have been distributed to packing houses and advice given on the effects of the contact of citrus juice with metals; the preservation of citrus pulp and concentrates and the effects of concentration on the vitamin C content.

Coconut

108. A general study of the coconut diseases of the island was made during the year and a pamphlet on the subject prepared and issued.

109. *Bronze Leaf Wilt* The occurrence of cases of this disease in the Duncans area caused some alarm among planters, and as the previous theories as to the cause do not explain the observed and recorded facts in Jamaica, it was considered that until more is known with regard to its real nature it should be treated as if it were infectious.

110. With co-operation of planters Government therefore carried out a clearance of diseased palms on the North West coast, initially in Trelawny, which is on the outskirts of the area affected, and subsequently in Hanover and St. James. Over 18,000 palms were felled. Legislation was introduced (Bud Rot and Wilt Disease of Coconuts Order of Nov. 30th, 1943) to enforce destruction of diseased palms where necessary. Burning has not so far been enforced in areas where the disease was already epidemic and few coconuts remained, but is carried out when new cases occur in places hitherto free of the disease or only slightly affected. The general clearance of diseased palms having been effected, it now remains to deal with fresh cases promptly as they arise.

111. Government acquired as an Agricultural Centre, Haughton Court, Lucea, where the disease had assumed epidemic proportions, and a series of experiments and investigations were carried out there with the co-operation of the Lands Department, and also elsewhere in an endeavour to ascertain the true nature of the disease.

Sugar Cane

NEW VARIETIES

112. The following varieties were received at Cow Park Cane Nursery from the Plant Quarantine Station, Trinidad:—B.3915, and of the B40 series: 29, 91, 96, 97, 98, 99, 100, 102, 105, 108, 112, 114, 116, 117, 126, 130, 133, 152, 164 and 174.

113. The following varieties, having been multiplied sufficiently, were distributed to sugar estates:—B 37 series: numbers 03, 34, 37, 74, 75, 91, 157 and 175. B 38 series: numbers 155, 178, 187, 192, 197, 202, 203, 212, 230, 232 and 233. The number of cuttings of each variety distributed to each estate was reduced to between 24 and 6 to facilitate delivery or collection of varieties.

114. During the year the estates assumed the responsibility of supplying cane farmers with new varieties of canes. Distribution of varieties to wet sugar cane growers will continue to be done by the Department.

MOSAIC DISEASE TRIAL

115. A Mosaic Disease Trial with recently imported cane varieties of the B 39 series was planted on June 12th and observations continued until December 12th. Rows of 12 stools of the varieties in the test were planted alternately with rows of the same number of stools of B.H. 10/12. Results were as follows:—

Mosaic Free Varieties. B. 39184, B. 39207, B. 39211, B. 39213, B. 39214, B. 39220, B. 39223 and B. 39257.

Varieties with Slight Infection (1 to 3 stools): B. 39157, B. 39215, B. 39192 and B. 39222.

Moderate Infection (4 to 6 stools): B.39177 and B. 39199.

Large Infection (7 to 9 stools) B. 39198 and B. 39200.

Very Large Infection (11 stools): B. 39240.

NURSERIES

116. The Long Pond Cane Nursery in Hanover was closed down consequent on the new organisation for the distribution of cane tops.

117. A small nursery consisting of FC. 916, M. 28, P.R. 803, B. 3439, B. 34110, B. 35187, P.O. J. 2878, Co. 213 varieties was maintained at Newton Farm Agricultural Station for the distribution of tops; there was, however, little demand from small farmers in the district.

PESTS

118. Apart from localised outbreaks of the West Indian Cane Fly, *Delphax saccharivorus* Westw., which did little damage in Clarendon, no pest did appreciable damage to sugar cane.

119. On account of transport difficulties, the annual survey to ascertain the economic significance of the Moth Borer, *Diatraea sacharalis* F., was conducted only in the varietal plots at Hope where the following results were obtained:—

Varieties	Stalk Infestation %	Nodal Infestation %
M.P.R. 63	..	..
P.O.J. 2727	10	.43
P.R. 803	..	..
B. 34110	10	.55
B. 3439	..	..
P.O.J. 2725	..	..
B. 3172	..	..
P.O.J. 2878	..	..

Cacao

120. Cacao budwood of six Imperial College of Tropical Agriculture selections, numbers 1, 6, 8, 45, 54 and 98, was imported from Trinidad in September. 63% of the 550 buds were alive on November 20th but, between then and March 31st, 6% died, and of the 352 remaining buds 54 (16%) were still dormant. The number of buds for each selection was as follows: No. 1—96, No. 6—85, No. 8—44, No. 45—38, No. 54—70, and No. 98—19. A nursery of 3,500 cacao seedlings has been planted, in which the selections will be extended by budding, while a battery of six propagators has been built for the planting of cuttings.

Coffee

121. *C. arabica var. columnaris* imported from Puerto Rico and planted at Grove Place in Manchester has so far proved disappointing from the viewpoint of yield.

Avocado Pear

TRIAL ORCHARDS

122. Planting was completed at Lucky Hill Pen and begun at Knockalva and Orange River. A small orchard was planted at Newton Farm.

123. Inspection of orchards in western and central parishes revealed satisfactory development. Pear plants are however proving very susceptible to water-logging. Gottfried and Lula varieties continue to be the most vigorous. Three year old plants of Lula, Collinred, Collinson and Gottfried gave crops in several orchards. Scab (*Spacheloma perseae*) attacked the Lula variety in Manchester. Ant attack developed in two orchards but was controlled in one with Bordeaux Paste applied to affected parts and in the other by watering the ground with kerosene jeyes emulsion.

COLD STORAGE TRIALS

124. Trials were carried out in conjunction with the Department of Commerce and Industries at temperatures between 42° and 47° F. to discover which varieties could not be considered for export under cold storage conditions due to susceptibility to "Internal Breakdown" Disease. Varieties of the West Indian Race and crosses between the West Indian and Guatemalan Races namely Mona, Pollock, Simmonds and Trapp (West Indian varieties), Winslowson, Collinred, Collinson and Lula suffered from Internal Breakdown. Only 1% of the Lula and 11% of the Collinson fruit, however, were affected, whereas varieties of Mexican Race (Gottfried), Mexican x Guatemalan Cross (Fuerte), Mexican x Unknown Cross (Eagle Rock) and Guatemalan x Unknown Cross (Linda) were unaffected.

Mango

125. In the course of producing plants for a mango stock variety trial, experiments were carried out on the budding of Bombay, Haden and St. Julian varieties on fifteen different stocks in March, April, May, June and August. While the F values for 'stocks' and 'months' effects did not pass their tests for significance that of 'scions' did and it can be said that the Haden variety is more easily budded than the St. Julian and as equally easily budded as the Bombay; while the St. Julian and Bombay varieties are as easily budded as each other.

126. Mango and cacao budwood kept well and gave satisfactory budding results at the end of ten days storage in camp moss, except for mango budwood of the St. Julian variety and patch budwood of cacao; this could not be used for it would not lift. Half of the buds from the stored mango budwood had their "pith" removed for comparison with the other half of the buds which had their pith left in. Results from this experiment were analysed, using Student's technique, and the better results obtained when the pith was removed were found significant.

Pineapple

127. Pineapples planted at Majesty Pen were affected by the drought from the time they were set out. It is expected that at least 50% of the 30,000 suckers planted will survive.

Plantain

128. Attention is being paid to the multiplication of the Giant Plantain and about 5,000 suckers will be available for distribution this year.

129. Nurseries were established at Orange River Agricultural Station in the autumn of 1943 with four varieties of Plantain, known locally as Giant, Maiden, Horse and Whitehouse, to provide material on which the Government Entomologist could carry out investigations on the relative susceptibility of different plantains and bananas to attack by borers.

Grain Crops

MAIZE

130. *Breeding* Continued mass selection has produced a yellow corn of suitable type for local production of grain for meal manufacture. Dark pericarp colour has, for practical purposes, been eliminated.

131. The demand for seed is increasing appreciably and prejudice against yellow corn is being steadily overcome. 284 bushels (of 60 lbs.) of seed were distributed for the Autumn planting of 1943 and 600 bushels in the succeeding Spring; the latter quantity was insufficient to meet the demand.

132. Mass selection of three new varieties with improved characteristics is continuing. These selections are being tested in trials with standard varieties.

133. From a number of inbred lines developed over the last four years and tested by top crossing, single hybrids have been raised and are being selected with a view to the production of synthetic varieties.

134. Work is being carried out on seed storage to devise means of carrying over stocks to meet the early markets. Weevil damage and loss of viability are the chief factors concerned.

135. Experiments have been begun with the object of an analysis of factors limiting yield under Jamaican conditions. It is suspected that the prevailing low yields are due more to inferior agronomic practice than inherent varietal deficiency.

136. *Field Experiments* Work on this crop was limited to the multiplication of selected varieties in connection with the Maize Breeding Programme. Plots were established on agricultural centres in the North and South Divisions and at Orange River and Grove Place Agricultural Stations. Yields were generally low being from 15 to 25 bushels per acre. It must be noted, however, that none of the centres nor Orange River Station are in accepted maize-growing areas. Phosphate-deficiency symptoms were in evidence on a wide range of soil types and there was also evidence of nitrogen deficiency in a number of cases.

137. *Pests* Army worms did considerable damage in some of the multiplication plots and were particularly difficult to control in crops planted on irrigated alluvial soil on Twickenham Park and Grove Farm.

RICE

138. *Swamp Rice* Four varieties of swamp rice, Lacara, Derihi Small, Derihi Large and a local type were established in June and July on a total of about 40 acres on two centres, Dover and Caenwood. Although a considerable part of both areas was covered either with heaps of rushes, grass, etc., or with stumps, and bunding had not been completed to make proper control of water possible in all sections, the average yield exceeded one ton per acre of paddy on both centres, and the highest recorded plot yielded over 2¼ tons. There was evidence of considerable differences in yielding capacity of the 4 varieties. A small winter sown crop at Dover grew normally but most of the ears produced were blind.

139. *Hill Rice* Yields from 10 cwt. to over 1 ton per acre were obtained on heavy marine clay soil under irrigation at Twickenham Park and on medium alluvial irrigated soil under high rainfall conditions at Windsor. The crop failed on light alluvial irrigated soil under the hot conditions existing at Twickenham Park and Grove Farm and also failed on other soil types, although in some cases it was not clear whether the soil or summer drought was primarily responsible for the failure. At Twickenham Park it was observed that direct sown hill rice gave much better yields than transplanted rice, and a satisfactory method of planting by seeder was evolved which materially reduced costs of production. Five different varieties of rice, three white seeded and two red, were included in the trials, but further tests will be needed before final decisions as to their respective merits can be made.

140. Results of a trial at Majesty Pen did not pass the test for significance, but at Grove Place variety 53 proved itself of superior yielding capacity to 50, 52, 22 and 12. The latter two varieties yielded many grainless ears, this they also did to a lesser extent, at Majesty Pen, where irrigation water was supplied to them at their critical seed setting period. Yields were poor, ranging from 850 to 50 lbs. at Grove Place and 963 to 704 lbs. at Majesty Pen. A trial was also planted at Orange River but the results could not be given statistical analysis as the growth had been unhealthy, apparently due to unsuitability of soil conditions.

141. Six varieties of hill rice planted at Orange River Agricultural Station in September, 1943 failed to produce more than an average yield of 77.5 lbs. per acre, the best variety producing 225 lbs. The main cause of the failure is thought to be unsuitable soil type, but further trials are being carried out to confirm if this is actually the case or not.

SORGHUM

142. A dwarf variety of sorghum planted on a large scale both on sandy alluvial soil and, marine clay under irrigation at Twickenham Park gave yields ranging from 20 to over 30 bushels per acre in about 12 weeks, irrespective of the time of year it was planted. Equally good crops were obtained under irrigation at Grove Farm while under very high rainfall conditions at Windsor and Seaman's Valley 5 acres, established on alluvial soil during the summer, yielded 22 bushels per acre. On other centres good growth was also generally obtained, except in crops planted in the late autumn or under light shade, but yields tended to be low due to the poor stands often obtained with hand planting. Marked improvements in stands generally resulted from the use of seed planters, due it is believed to more uniform depth of planting and to the pressing down of the soil by the small roller on the planter which not only causes better contact between the seed and damp soil but may protect the seed better from ants and birds. If difficulties experienced in shelling this crop can be overcome, it should be regarded as a suitable crop for large scale production in many parts of Jamaica.

143. Two small crops of the same dwarf variety were planted in May and September, 1943, at Orange River Agricultural Station. Both produced uneven germination, weak growth and a large proportion of heads with only a few properly developed seeds. Trials are to be continued because this variety has given very promising results elsewhere under a wide range of conditions

144. It was found difficult at Hope to obtain successful germination of sorghum and rice in the Spring of 1943 for a pest suspected of being a rodent robbed the seeds before they had time to germinate.

145. Improvement in germination was obtained by soaking the seed in cold water for 12 or 24 hours or in water 112° F. for five minutes before planting. The increased speed of germination gave pests less time to operate. Tarring both types of seeds and dusting sorghum seed with ashes damped with paraffin, depressed germination. Paraffin and tar cannot therefore be recommended as deterrents.

ADLAY

146. Adlay grown on alluvial soil under conditions of high rainfall at Windsor and Seaman's Valley yielded approximately 50 bushels to the acre and ratooned satisfactorily, but limited trials elsewhere have so far been disappointing.

147. A 1/20 acre plot of adlay sown in April, 1943, at Orange River Agricultural Station yielded 46 lbs. seed, *i.e.*, 920 lbs. per acre, but did not ratoon satisfactorily after cutting back. A second crop sown in September and reaped in January appeared to give a similar yield but labour trouble at the time of reaping made accurate recording of the yield impossible.

148. The yield obtained at Grove Place Agricultural Station was only 280 lbs. per acre.

Pulses

SOYA BEAN

149. *Field Experiments* In general soya beans grown on agricultural centres in the north and south Divisions and sown between October and December have made relatively weak growth and produced low yields, particularly in the wet northern parishes, whereas stronger growth, a longer growing period and better crops have been obtained under similar conditions in crops planted between January and September.

150. On soils known to be acid and markedly deficient in phosphates very poor results have been obtained but elsewhere good crops have been produced under a wide range of conditions of soil and climate provided that the land was thoroughly drained. Experience has shown that seed kept for a few months in a damp climate may lose its viability, and similarly a high percentage of seed planted under exceptionally wet conditions in soils that are not very free draining may rot. In raw land just broken for planting cut worms and mole crickets may reduce the stand seriously. Finally it has been found that reaping should generally be done when the leaves turn yellow and start to drop and the

lower pods turn brown, because if it is delayed until the plants are leafless and the pods all turn brown slight rain often results in a high percentage of the pods and beans becoming mouldy. It is thus clear that while soya beans may be regarded as a promising crop for many parts of Jamaica considerable skill is needed to grow it successfully under many conditions, and further trials are necessary before it can be generally recommended. Observations on the two varieties, Trinidad and Palmetto, that have so far been planted indicate that the former is the more vigorous and probably will give higher yields under most conditions, although it takes three to five weeks longer to mature.

151. The variety Palmetto used in a field experiment at Orange River Agricultural Station planted in May, 1943 produced a very even stand and made excellent growth in spite of drought in June and July, but produced a mean yield of only 572 lbs. per acre.

152. A black seeded type found growing among Palmetto plants has been isolated and a multiplication plot established.

153. In an experiment planted at the Orange River Agricultural Station also in September, 1943 with the variety Trinidad spaced 18" x 12", plants weeded twice, either at four weeks and eight weeks or at six weeks and nine weeks, produced over twice the yield of plants weeded only once at four weeks, and nearly eight times the yield of plants that were not weeded at all. Differences between crops that had been weeded twice at different times were not significant, the yields expressed in lbs. per acre being 822 and 817 lbs. respectively. This result is of particular interest in that one weeding is commonly considered to be sufficient for soya beans, and secondly, because the second weding was done at a time when the plants were flowering and setting pods, and cultivation in the field at that time is often regarded as likely to reduce the crop. Further trials are being carried out.

154. *Longevity of Culture on Innoculated Soya Beans* Soya beans were planted one to eight days after innoculation. The number of nodules which developed varied inversely with the length of time after innoculation; only those planted a day after innoculation showed an appreciable number. Innoculation of seed at time of sale cannot therefore be recommended except in cases where seed will be sown within a day of its purchase.

COW PEA

155. *Yields* Very variable yields have been obtained on Agricultural Centres in the North and South Divisions with varieties of cow peas notably the Blackeye and Caroline. Four acres of irrigated alluvial soil planted with Blackeye pea during the winter of 1942-43 at Grove Farm yielded 28 bushels per acre, but in a large number of cases yields have been below ten bushels. In wet climates this has in part been due to the prevalence of mildew and particularly where areas have been shaded even if only lightly, but it would appear that this crop, though common throughout the island, requires considerable investigation as to soil and fertilizer requirements, times of planting and spacing before its production on a larger scale can be encouraged.

156. *Variety Trials* In three Spring planted and two Autumn planted variety trials at agricultural stations and Majesty Pen Relief Works variety No. 4 gave the best performance of the varieties tried. Caroline and Blackeye, two widely grown varieties, were proved inferior. No. 5 variety, however, gives greatest promise as it matures its entire crop about two months earlier and the buff colour of its peas are more suitable for the market than the mottled purple of No. 4.

157. *Spacing Trials (Majesty Pen).* The results of this trial planted with variety 5 on November 1st showed that while a spacing of 2ft. x 1 ft. led to greater yields than those of 3 ft x 2 ft, 3 ft. x 1 ft., 2 ft. x ¾ ft.; and 2 ft. x 2 ft., it was not proved superior to spacings of 3 ft. x ½ ft., 2 ft x 1½ ft. and 3 ft. x 1½ ft.

158. *Fertilzer Experiments* On Newton Farm soils cow peas, which are reported to be able to withstand acid soils, did not respond to the residual effect of twice the lime requirement applied to the previous crop. The response to phosphate residues was however outstanding (an increase of 93%).

GROUND NUT

159. Yields of 40 to 60 bushels per acre have been obtained from the upright variety Valencia grown during the summer under irrigation on alluvial soils at Twickenham Park and Grove Farm. Planting by seeder on small ridges and inter-cultivation by mule drawn scufflers has been found satisfactory and much more economical than hand cultivation. Results obtained with this crop on the same centres in the winter months, and on different soil types on other centres have been generally disappointing, but trials are being continued.

160. At Grove Place Agricultural Station this crop grew well but yields were low. Weather conditions were not sufficiently reliable at harvest and labour costs too high.

GRAM

161. Gram: *Phaseolus mungo* (Wooly Pyrol), *P. aureus* (Mung Bean) and *P. trinervius* (Jerusalem Pea). Three Spring and two Autumn planted variety trials were reaped at stations and Majesty Pen. In the Spring trials Wooly Pyrols (varieties 1 and 5) gave the best yields but as the seeds of these are black they cannot be expected to become popular for eating. The Mung Bean variety No. 6 which did the next best has to be considered the most promising. At Majesty Pen in the Autumn the Jerusalem Pea No. 9 which cannot be planted in the Spring because of an extended growing period gave better yields than No. 6, while No. 2 (a Mung Bean) gave as good yields as No. 6, although it was inferior to No. 6 in the Spring trial.

162. Mung Beans grown at Windsor on alluvial soil and with high rainfall gave promising results, and further trials are to be carried out.

OTHER PULSES

163. Observation and multiplication plots were established of varieties of Pigeon pea, Kidney bean, Cluster bean and an edible type of a Canavalia.

164. The dwarf, early cropping varieties of pigeon peas were planted on three centres, but have been abandoned as a seed crop because of the excessive cost of reaping the small pods they produce and a tendency to die back after the first crop, which in no case was anything exceptional. It is possible that they might prove useful as a forage crop, but this has not yet been investigated.

Root Crops

YAM

165. Several different varieties of yam including yampies planted on five centres located in yam growing areas have been established under conditions comparable with those practiced by peasant farmers in the district. The trials are a preliminary to investigating local methods of cultivation and several modifications of these methods are being tried in the crop planted in the Spring of 1944.

SWEET POTATO

166. Sweet potatoes have been planted on all centres, the yields obtained ranging from about ten cwt. up to five tons per acre. From the wide variations in yields obtained in variety collection plots it would appear that varietal differences are likely to prove one of the main factors responsible for low yields, and preparations have been made to carry out variety trials with local and imported types, of which there are apparently not less than 30 distinct varieties scattered throughout the island.

167. Manurial and variety trials are also in progress at Grove Place and Newton Farm Agricultural Stations.

CASSAVA

168. Cassava has been planted on the majority of the centres but the highest yield obtained to date has been approximately six tons, and most areas have yielded only three or four tons. A wide range of varieties has again been in evidence, and these as well as standard methods of cultivation, clearly require investigation.

169. Two experiments are in progress at Grove Place Agricultural Station—variety, time of reaping and manurial trial. Results have been adversely affected by praedial larceny but yields in some instances have been promising. A collection of varieties for future experiments is proceeding.

170. The effects of varieties, age of reaping and fertilizers on the yield and chemical composition of cassava are being studied.

COCO AND DASHEEN

171. Cocoes grown on agricultural centres in the wetter areas have generally yielded about two tons per acre divided between a main crop reaped at 11 to 12 months and a ratoon crop three to four months later, and in view of the time occupied in the ground these yields cannot be regarded as satisfactory. Dasheens grown on wet land at Windsor yielded approximately two tons in six months. Trials are continuing.

Fibres

COTTON

172. Mr. Hutchinson, Geneticist of the Empire Cotton Growing Corporation Research Station, Trinidad, visited Jamaica in Mid-1942 and gave the following advice concerning the possibilities of cotton growing:—(1) causes of past failure can be overcome; (2) it is not an agricultural impracticability on a wide range of conditions; (3) entomological research is required to determine whether pest control is possible; if this is not possible, the growing of cotton cannot be recommended; (4) entomological research required was stipulated; (5) decision as to type of cotton to be grown must await results of this research; (6) advice was given regarding sites of entomological research plots.

173. As a result, in September, 1942, eleven plots of Sea Island Cotton were planted at sites recommended, except for Bull Savannah and Pedro Plains. Sites:—(Mesophytic area) Meylersfield (W.I.S.Co. Westmoreland), Newton Farm, Grove Place and Orange River Agricultural Stations. (Xerophytic area) Rose Hall and Tryall (Rose Hall Estates Ltd.), Pusey Hall (W.I.S. Co., Vere), Twickenham Park Agricultural Centre, Cow Park Cane Nursery, Hope and Norris (Yallahs). (The W.I.S. Co. provided land and labour free while Rose Hall Estates provided land). V. 135 was the only variety grown except at Cow Park where it was planted in company with seven other varieties: B.S1, B.D, M.S1., Seabrook, V.H.8, V.H.9, and V.H.10 in a six block Randomized Block trial. Spacing was 4 feet between rows and 20 inches between plants in the row. Two plants were allowed to grow from each hole. Three weedings were given and at the same time, moulding up was carried out to stimulate the production of anchoring roots.

174. The Cow Park trial failed to provide information concerning varieties for want of statistical significance in the results.

175. Plots in the mesophytic area gave unsatisfactory results. Yields averaged 230 lbs. and the period between planting and first harvest was 180 days compared with 150 for plots in the xerophytic area. At Meylersfield only a 6% stand was obtained and plants became stunted by drought and aphis attack. At Newton Farm seeds germinated unsatisfactorily and the stand was decreased by cut worm and cricket attack and damping off. Growth was affected by the acidity of the soil and a severe attack of mildew (*Ramularia aerola*). Grove Place yielded the best crop (571 lbs.) but a sample of its cotton sent to the Shirley Institute provided lint which did not resemble that of normal V 135. Anthracnose appeared at Grove Place and Orange River which also suffered from Rust attach (*Ceratellium gossypii*).

176. In the xerophytic area Tryall, Rose Hall, Cow Park, Hope and Norris, yields were satisfactory (1700 to 683 lbs.). Plots in this area gave an average yield of 712 lbs. Yarn from Rose Hall and Yallahs was reported on as having fair strength and good appearance. A stand of only 41% was obtained at Twickenham Park. Incorrect planting led to the distance between rows varying from 6 to 4½ feet.

177. Individual plants grew remarkably well. A second plot was planted in November at Pusey Hall; germination was poor in both plots; in the case of the first due to too great a depth of planting followed by flooding. Both plots gave poor yields (65 and 85 lb. per acre). After an extended growing period of 225 days before harvesting began, plants in the first plot continued their vegetative phase in company with their reproductive phase, for bolls matured under an undiminished cover of foliage for three-quarters of the crop.

178. *Aphis gossypii* and Pink Boll Worm (*Pectinophora gossypiella*) were reported on all plots. Two *Coccinellids* controlled the former except at Meylersfield, before its effects could be felt. From two counts made at Hope in March the incidence of Pink Boll Worm was found, to be 65 and 72%. The Cotton Leaf Worm (*Alabama argillacea*) only appeared on the Rose Hall Estates' plots in November, when it was controlled by spring. Blister Mite (*Eriopes* sp.) was found on the Pusey Hall plot in April and at Hope after harvesting had finished. Other pests seen on the plots were (1) *Pentatomids, Nezara viridula* at Hope and *Euchistus bifibulus* at Pusey Hall, both feeding on the bolls; (2) the *Sycidid: Caleropteron militaris* feeding on the pollen at the Rose Hall Estates and Pusey Hall plots. Although numerous on the latter its damage was not apparent.

179. The Meylersfield, Newton Farm and Twickenham Park were the only plots which did not suffer from Stainer attacks (*Dysdercus andreae*). At Yallahs migrating adults appeared in large numbers on the first bolls, to which they were attracted from wild perennial cotton plants up to a distance of about three miles from the plot. Infestation began in the middle of the crop at Hope and was built up from a few adults. In his report the Entomologist states that it would be difficult, if not impossible, to control stainers on the narrow plains of St. Thomas and St. Andrew, backed as they are by slopes on which continuous blooming host plants such as *Urena lobata* and *Anoda acerfolia*, helped by Seaside Mahoe (*Thespesia* sp.) near the sea, support a moving stainer population.

180. Cow Park is completely and Twickenham Park partially surrounded by cane and banana cultivations. To the North of Twickenham Park are foothills covered with scrub in which host plants do not occur. Host plants (*Ceiba pentandra* "Cotton" trees) do however grow three-quarters of a mile away from Cow Park, by the Rio Cobre. From these, it seems, came the few stainers, which visited Cow Park towards the end of the crop. While the percentage of stained cotton at Norris and Hope was 29 and 22% of the crop, at Pusey Hall it was as much as 69% for the first and 67% for the second plot. Although a small number of stainers, they were responsible for great damage because of the small size of the crop. Numbers increased and then lessened when the stainers were attracted away by the blooming of Ceiba trees in the churchyard 1¾ miles away. The Pusey Hall plots had the same surroundings as the Twickenham Park plot but with the important difference that perennial cotton plants were numerous in the hills to the north and along the roads. The Entomologist suggests that removal of these plants and counter attraction from Ceiba trees, may promote control of stainers. At Rose Hall, it is probable that *Thespesia* trees along the coast are the only host plants, but to prove this, it would be necessary, in the case of another planting, to remove these trees for three or four miles along the coast, so that, if there are host plants in the hills behind, their existence will be unmasked.

181. The sheeding of bolls at Hope in December as they began setting, was considered by Mr. Hutchinson to be similar to that which occurs in Montserrat when heavy rains fall early in the cropping season. These, coupled with a large available supply of nitrogen, throw the plants from a reproductive into a vegetative phase. The irrigation water was supplied in abundance at Hope and also contained stable washings. Shedding amounted to 25% of the bolls. Bolls also wilted but did not shed themselves towards the end of the crops at Yallahs, Cow Park, Pusey Hall and Hope.

182. For the continuation of the entomological observations two one acre plots of four selections of perennial cotton have been planted at Hope and Cow Park. Another two will be planted at Bull Savannah and Pedro Plains when the drought lifts.

183 *Pests*—Seed cotton of the Sea Island variety reaped from the experimental plots at Rose Hall, Grove Place, Cow Park and Yallahs were submitted to Mr. J. B. Hutchinson, Geneticist, Empire Cotton Growing Corporation, Trinidad. Reports on the incidence of pests in various trial plots were submitted. The cotton stainer proved very destructive. At the end of the reaping season Blister Mites were observed in plots at Moneymusk, at Hope and at Orange River.

184. Mr. Hutchinson, in subsequent correspondence with the Department, stated that in view of the lack of success of the Sea Island Cotton Plots, he considered further attempts to grow this type would prove impracticable in Jamaica and the Department should concentrate only on the development of perennial cotton varieties.

FRENCH COTTON (*Calotropis procera*)

185. Fibre from this plant is used as a adulterant with kapok. Observation plots have been established at Hope, Grove Farm and Twickenham Park Centres. Now a year old, the plants at Hope are flowering well; at nine months they produced a few flowers, which did not set pods.

OTHER FIBRES

186. Assays of Sanseviera and a banana variety were made by an expert from Washington, but the results were not considered sufficiently good to warrant commercial extraction. Observation plots of luffas, sunn hemp and *Urena* varieties were established at agricultural stations and centres.

187. Small scale trials with different varieties of Luffa have been established during the period under review, containing locally selected varieties and one imported variety from Cuba. Yields from 5,000 to 1,000 Luffa strainers per acre have been obtained on the plains. While exports of this crop will be only on a very limited scale for some time, these trials are being undertaken with a view to the overseas market for Luffas being developed in the future.

Oil Plants

CASTOR OIL

188. *Field Experiments* A considerable acreage was established in castor oil spread over all centres. Final yield figures have not yet become available but it seems likely that they will be low in all cases. Varietal differences again appear to be a major factor, and small trials with an American variety known as the Connor were started on all centres in the Spring of 1944.

189. At Orange River Agricultural Station seven different types of castor oil isolated on a basis of seed characters from a mixed bag of seed imported from the U.S.A. were established in a scattered multiplication plots. Very few plants produced seed true to type indicating a high degree of cross fertilization in the original selections. Further selections are being made.

190. *Transplanting* Opportunity was taken when transplanting potted castor oil plants to study the effects of planting with pots removed, compared with that of pots remaining. Measurements of height taken four months later, when analysed by Student's technique, gave an insignificant difference between treatment means. It does not matter therefore whether pots are removed or not when transplanting castor oil. In the past the setting out of plants in basket pots was recommended as it was feared that the soil around the roots might be disturbed and roots broken by their removal.

191. *Dehydration* It was shown that locally produced castor oil can be successfully converted to a drying oil by using local kaolinitic earths as catalysts. The oil produced dries to a varnish-like finish in 36-48 hours with or without driers. The Public Works Department reported favourably on the dehydrated oil as a paint vehicle.

SUNFLOWER

192. A limited number of field trials with this crop suggest that high rainfall does not interfere with maturing but with viability of seeds, and sizes of individual plants and heads have been found to vary greatly, and in general yields have been poor. A considerable improvement resulting from further trials will be needed before this crop can be regarded as of potential commercial value.

193. At Orange River Agricultural Station two small crops grown from seed thought to be of one variety of sun-flower gave fair yields but in both cases segregation of other types occurred.

SESAME

194. Small trials were established at Orange River Agricultural Station and on most centres during the winter of 1943-44, but growth was weak in all cases except that of the last plot to be planted, which was sown at Twickenham Park in February. This tends to confirm previous observations that the crop is not likely to succeed if grown during the winter months possibly as a response to length of day.

TUNG OIL

195. A trial planting of cuttings of Tung oil (*Aleurites trisperma*) resulted in complete failure of cuttings to root. Condition of parent trees at the time cuttings were taken is suggested as a reason for this.

Drugs and Insecticidal Plants

STRAMONIUM

196. Observation plots were established on most stations and centres during the winter of 1943-44, and samples of dried leaves submitted for analysis.

DERRIS

197. Multiplication of three varieties continued at the Orange River Station and samples of roots from two of them were sent to Washington for determination of rotenone content.

198. Cuttings of three varieties of *Derris elliptica* (Changi No. 3, Amani S and Creeping Sarawak) were received during the year.
199. At Grove Place Station multiplication of three varieties for comparative experiment are in progress. Growth is slow and apparently this plant is not suited to Grove Place environment.

PYRETHRUM (*Chrysanthemum cinerarifolium*)
200. Seed imported from Kenya did not germinate. The Inspector General of Agriculture advised against further trials when application was made for further supplies of seed. Several trials had been undertaken in previous years with this crop, but with no better results than the production of a few undersized plants after three years growth. Climate is believed unsuitable, lacking as it does, conditions which produce light mists in the morning at suitable altitudes.

Rubber Plants

201. *Para and Castilloa Rubber* Experiments were carried out in co-operation with the Lands Department in tapping Para and Castilloa rubber trees growing in various parts of the Island.
202. About 3,000 lbs. of Para rubber obtained from the Troja Land Settlement was shipped by the Lands Department.
203. Experimental tapping was also carried out on Castilloa rubber trees at Rose Hall and good yields were obtained. Difficulty was however experienced in securing coagulation of the latex. About 200 lbs. of rubber was extracted.

GUAYULE (*Parthenium argentatum*)
204. Germination of Guayule (*Parthenium argentatum*) seed, received for trial was poor. It could have been improved by treatment with calcium or sodium hypochlorite solution, but this chemical was not obtainable locally. Plants which grew showed themselves extremely difficult to transplant.

CRYPTOSTEGIA (*C. grandiflora*).....
205. *Crypstolegia grandiflora* (Purple Allamanda) has been established on small plots at agricultural stations and Twickenham Park and Grove Farm Agricultural Centres. Yields obtained will be compared with Haitian and Queensland yields. At present there are no grounds for its expansion in Jamaica.

Fodder Crops

206. Analytical examination of varieties of fodder grown at Hope as influenced by age and season of cutting was completed. Guatemala Grass, which attains maximum nutritive value at three months is much superior to Guinea Grass, Uba and Co. 203 Canes.
207. A variety, manuring and age of cutting experiment was carried out at Grove Place on *terra rossa*. The laboratory analytical work is incomplete at present. Field observations suggest that varieties of Elephant Grass are by far the most desirable, though Guatemala Grass can out-yield Elephant Grass in periods of heavy rain. A similar experiment is being laid out on acid, phosphate deficient clays at Newton Farm.
208. *Nutritive Composition of Wynne* (*Molasses*) *Grass* Samples obtained from various parts of the Colony were analysed. The protein varies greatly, mainly with age of cutting, type of grazing, and the part of the plant. On the whole, the most nutritious part of the plant has a protein content of only one half that of average Guinea Grass or Guatemala Grass. Therefore until a system of cropping can be introduced which increases the protein value of this grass considerably, its extension should be limited to lands which will not grown Guinea Grass.
209. *Silage* A simple experiment designed to measure the influence of the degree of compaction on the quality of silage made from (a) Guinea Corn (b) Elephant Grass, was begun.

Cover Crops

210. Edua, Overlook, Bengal Bean, Jerusalem Pea, *Calopogonium*, *Tephrosia candida*, and the slow growing Mung Bean ACB 420 were planted under bananas for observation, but establishment has so far proved difficult.
211. *Tephrosia candida* *Tephrosia candida* is often mentioned as a crop with which it is difficult to obtain good stands. This has been attributed to loss of viability of its seed. It is also difficult to obtain successful germination from *Indigofera endecaphylla* seed. Treatment with concentrated sulphuric acid for different periods showed that speed of germination can be improved and amount of germination increased by eight times for *Tephrosia* and five times for *Indigofera*, when seed is soaked for between 15 to 20 minutes for *Tephrosia*, and 20 to 25 minutes for *Indigofera*, before planting.
212. A cutting back experiment with four year old *Tephrosia candida* plants was carried out at Hope. This experiment was arranged as a randomized block trial. Results showed that plants should not be cut back to heights lower than 1 ft. 6 ins., otherwise deaths to the extent of 38% at 1 ft. and 67% at 6 ins. are to be expected.

Miscellaneous

BAMBOO
213. Two bamboos, *Dendrocalamus membranaceous* and *Bambusa tulda*, grew from an importation from Puerto Rico. The plant of *B. tuldoides* imported previously is growing satisfactorily.

Diseases

214. The following diseases were recorded for the first time in Jamaica:—Angels' Trumpet (*Datura suaveolens*), Leaf Spot, *Cercospora abchazica* Siemaszko; Chinese Cabbage, Leaf Spot, *Alternaria oleracea* Milbrath; Castor Oil, Leaf Spot, *Cercospora ricini* Sacc. and Berl, Leaf Blotch, *Phomopsis* sp.; Elephant Grass (*Pennisetum purpureum* Schum.), Leaf Spot, *Helminthosporium sacchari* Butler; Onion, Leaf Blight, *Macrosporium parasiticum* Thum., Soft Rot, *Erwinia caratovora* (L. R. Jones) Holland.
215. The fungus causing Fruit Rot of Loofahs and listed last year as *Macrophoma* sp. was finally identified as *Botryodiplodia theobromæ* Pat.

Pests

216. During the year a large number of insects were submitted to this Department for identification. Information and advice as to control measures were given according to particular circumstances and requirements.

TERMITES
217. The species of termites which destroy seasoned wood are rapidly becoming pests of major economic importance in Jamaica. During the period under review the Government Entomologist continued to work on this problem and has inspected and recommended methods of control in the case of a larger number of buildings belonging to both Government and private individuals.

3. INVESTIGATIONS HAVING DIRECT REFERENCE TO THE DEVELOPMENT OF A SYSTEM OF FARMING

Farming

SOILS OF THE HOPE AGRICULTURAL STATION
218. Out of the total area of potentially arable land (so far as slope is concerned), including the gardens, only 18% is sufficiently heavy to support arable farming under natural rainfall alone. The remainder contains between 30% and 70% of gravel, stones and sands, silty sands, or sandy loams. Successful farming of these soils will depend on soil water conservation first, followed by heavy, frequent applications of nitrogenous manures and, in certain areas, an application of phosphates and potash. Recommendations for land-use and farming methods have been given.

FERTILIZER EXPERIMENTS
219. Permanent inorganic fertilizer experiments using a notation of food crops were carried out at Grove Place Agricultural Station. The results indicate that in the presence of potassic dressings (one cwt. KCl/acre) the residual effects of 30,000 lbs./acre of grass mulch are small, but yield an increase of 40% in the absence of potash (peanuts). For sweet potatoes, the effect of a mulch application is equivalent to that of one cwt./acre KCl (90% increase). Significantly higher yields are obtained by applying mulch and one cwt. KCl than two cwts. KCl alone per acre. The experiment is now being continued with two varieties of fodder grasses.
220. The results from a similar experiment confirm the conclusion that the effects of one cwt./acre of KCl do not outlast more than two successive crops, and that mulch applied to peanuts is detrimental (presumably because of its mechanical effect on the plant). This experiment also has been planted out in two varieties of fodder grasses.
221. Permanent fertilizer (organic and inorganic) experiments with food crops were also carried out at Orange River Station. Summarised over four crops the results show that these soils have not responded to potash, farmyard manure, mulching or green manures to date. Soya beans respond to phosphates and lime, maize does not respond to liming.

IMPLEMENTAL TILLAGE
222. On agricultural centres in the North and South Divisions considerable strides have been made with implements of various types, particularly small hillside ploughs, scufflers, and seed planters drawn by single mules, steers or pairs of steers. The main progress has naturally been made on level land, but satisfactory work has also been done on contoured hillsides with slopes of up to 20°. From the information so far

obtained it would appear that the use of implements will reduce costs of cultivation on level land to between 20 and 30% of cultivation by hand, and on hillsides with slopes up to 20 to between 30 and 50%. Preliminary trials with seed farmers, etc., suggest that further considerable reductions in costs can be made by using machinery to thresh and clean grain and pulse crops.

223. On contoured slopes at the Orange River Station that had been in cultivation for a year or two, small turnwrest or hillside ploughs drawn by a single mule have done satisfactory work, and observations suggest that ploughed beds produce fewer small rills with heavy rain than do beds forked by hand. For ploughing on raw land and particularly heavy patches of soil two steers may be needed in place of a mule Different types of small harrows, cultivators and single row seed planters have also been used satisfactorily with a single mule, and a petrol driven garden tractor has been acquired for trial.

EXPERIMENTAL HOMESTEADING

224. At Newton Farm Agricultural Station an area of some 7½ acres was set aside during 1942 and partly laid out with the object of establishing and studying the economics of mixed farming, rotations, and implemental tillage. A cow shed made of local materials was completed and a simple pig sty and poultry house were built. Three heifers and a sow were installed. The building of a simple cottage for the "Homesteader" is proposed. Detailed records are being kept.

225. Various rotations are being tested out on a four acre contour grassed hillside area, especially set aside for this purpose. Importance of lime applications was demonstrated by the increased yields obtained from peanuts, ginger and other crops, which, heretofore, failed to give economic yields.

Orange River Agricultural Station

SOIL CONSERVATION

226. *Grass Bank or Bench Terracing* Observations on this method of soil conservation were continued, and in addition to confirming results recorded in the 1942-43 report. provide the following information:—

227. (i) *Trenching* Contour trenches, 2′ x 18″ in cross section with a fall of 1:300, in place of the standard fall of 1:100 generally used, carried surplus water from beds about 22 feet wide and up to 10 chains in length without overflowing where carefully graded, but in a few cases where the grading did not continue uniformly throughout their lengths, overflowing and some silting up and scouring occurred during periods of heavy rain.

228. (ii) *Barrier Grasses* Trials to date suggest that only strong rooted upright grasses, closely spaced, effectively check erosion of soil from the bed above, and of the species so far tested, only Khuskhus, *Vetiveria zizanoides*, spaced initially 6″ apart combines a really strong root system with a compact barrier. Other upright grasses of some value not only as barriers but to provide fodder, etc., are Elephant Grass, *Pennisetum purpureum*, which forms an effective filter in three to four months, but is too tall and makes stools too wide to make its use satisfactory on beds less than 20 feet wide; Guinea Grass, *Panicum maximum*, which tends to grow patchily and has a relatively weak root system and Lemon Grass, *Cymbopogon citratus*, which makes an exceptionally compact filter but has a very weak root system. Upright grasses that have proved inferior under conditions at Orange River are Guatemala Grass, *Tripsacum laxum*, which makes a poor filter and is liable to die out; Uba Cane, *Saccharum spontaneum*, which is also liable to die out if cut at all hard, and an ornamental cane, *S. ciliare*, which does not tiller sufficiently. None of the recumbent and semi-recumbent grasses tried have effectively checked erosion when kept as thin barriers and all tend to encroach into the cultivated beds. The species so far tried are:—Bahama Grass, *Cynodon dactylon*, Savannah Grass, *Axonophus compressus*, Crab Grass, *Stenotaphrum secundatum*, Molasses Grass, *Melinis minutiflora*, American Blue Grass, *Panicum coloratum*, and a species known as *Amphilopsis pertusa*. Non-gramineous plants tested so far are *Alternanthera tricolor* and *Alternanthera ficoidea*, both of which have proved valueless, and *Sanseviera guineensis*, which after two years had still failed to produce an effective barrier but was already sending stolons many feet into the cultivated beds.

229. *Strip Cropping* In the relatively small area of steep land with slopes exceeding 25° which was strip-cropped with alternative contour belts of grass and arable, it was found that the widest strips, ranging from 25 to 30 feet, were more satisfactory than narrower strips in that the fodder grasses planted in the latter tended to encroach into and overshadow the cultivated areas, but on the other hand there was considerable downward movement of soil in evidence in the wider beds. Of the fodder grasses planted in the alternate strips, Elephant appeared to be the most satisfactory and produced substantial quantities of fodder or mulch when cut at six-week intervals.

230. *Matengo Cultivation* Observations suggest that there was some check to erosion from the East African Matengo system of pits established on a steep hillside except during very heavy showers when some pits overflowed and scouring occurred. The large amount of labour required by this system may, however, render its cost prohibitive under nearly all conditions in Jamaica.

Newton Farm Agricultural Station

231. The total area which has been established in contour grass barriers, terraces and strip cultivation, including an area especially set aside for Matengo pits, amounts to 77 acres. Work on a series of run-off plots continued.

Western Division

232. A total of some 250 acres has been planted with contour grass or stone barriers, strip cultivated, or terraced at Newton Farm Agricultural Station, livestock training and agricultural centres. In addition, soil conservation methods have been carried out on some 750 acres by Agricultural Instructors in the Division, bringing the total figure to approximately 1,000 acres. An increased interest was taken by the planters and farmers in this direction during the year; the importance of such work is gradually being realised.

Agricultural Centres, North and South Divisions

233. *Grass Bank or Bench Terracing* By the end of the year approximately 1,000 acres of gentle and moderately sloping hillside land had been contoured, trenched and planted with barrier grasses on lines developed at Orange River. Results obtained to date suggest that the method, if properly done, gives satisfactory control of erosion on all the soil types represented on the Centres.

234. *Stone Wall Terracing* 7½ acres were developed with complete stone walls that will support level terraces. The method is obviously effective but the cost very high.

235. *Strip Cropping* 13 acres of relatively steep land were contour strip cropped for observation.

236. *Artificially Levelled Terraces* On approximately eight acres level terraces were cut by hand for purposes of demonstration and observation.

SUBSOIL WEATHERING EXPERIMENT

237. In view of the extent to which many areas of Richmond Bed soil had lost their top soil through erosion, a trial was designed to obtain information on the rate at which the shaly subsoil in this series weathers on exposure to air, and on methods of rendering it fertile for cultivation. Four large terraces are being artificially cut in which the top 18″ of soil consists in each case of one of the following materials:—

Top soil	0–6″ zone,
Subsoil	6″–12″ zone,
Subsoil	12″–18″ zone,

and parent shale two ft. and more below the surface.

Miscellaneous

COLLECTIVE FARMING

238. During the year there was appreciable progress in agricultural development of the project in collective farming being carried out at Lucky Hill. Advantage was taken of experience gained in the growing of crops during the previous year and there was an improvement in field returns. For economic purposes the project was regarded as a single unit though the five Pioneer Clubs continued to exist until the 31st of March, 1944. It was therefore possible to concentrate on a policy of rendering practicable development as a collective farm.

239. Organization of the system of intensive mixed farming decided on was largely experimental in the early stages and still is, to some extent. Limited guidance could be obtained from local experience and both crops and livestock were selected mainly on consideration of soil and climatic conditions.

240. *Implemental Tillage* The training of settlers in the use of mechanical implements of various types has been continued. Preparation of fields for planting is now done mostly by plough and harrow, drawn by oxen or mules, and sowing by single or double drill sowers but some difficulty has been experienced in introducing the custom of intercultivating with scufflers.

241. *Staff* The Lucky Hill Project is operated under the direct supervision of an Overseer employed by the Department of Agriculture which is in collaboration with the Local Committee of Supervision responsible for the planning of all field programmes. These are carried out by the Overseer with the help of an Assistant Overseer and five headmen selected from among the settlers. Two Assistant Overseers and two headmen were changed during the year.

242. *Accounting System* Detailed costings are kept in connection with all phases of the operation of the Project with the aim of determining at any time and without undue trouble what constitutes the most productive units. Slight modifications have had to be introduced with new developments but the system has remained essentially as devised in 1942.

243. *Buildings* An extensive housing programme was planned but shortage of building materials handicapped construction of cottages. A new office was completed during the year and six cottages begun.

244. *Social Welfare* On account of the housing problem and lack of facilities for communication, etc., there has been little progress in social development. Several men have left the project for employment elsewhere and it has been necessary to subject a number of those remaining to disciplinary action for anti-social behaviour.

215. Voluntary co-operative effort is almost completely absent as can be deduced from the disappearance of the communal plots and the general lack of enthusiasm of the project for individual benefit apparent among the majority of members. There are still, however, some who continue in appreciation of the aim of the project and who by their example may influence others to the general good.

MICRO PLOT SURVEY

216. Co-operation has been maintained with the Senior Agricultural Officer, North East Division, in using the zoning technique of Micro Plot (1 x 1) field fertilizer experimentation with maize cut at four weeks old for exploratory purposes for the main plant food deficiencies on agricultural training centres. The results obtained are being correlated with soil analyses.

217. The method is particularly suited to phosphate deficiencies, and preliminary data suggest that the response curves (of the Mitscherlich type) derived from successive crops without further application of phosphates, may form a useful means of investigating in a quantitative way, the rate of fixation of soluble phosphates by soils.

PHOSPHATE CAVE DEPOSITS

248. Investigations were made with regard to the agricultural value of phosphate cave deposits of the Portland Ridge area. It was found that total P_2O_5 contents are generally greater than 15% and some as high as 40% of the dried material. Field experimentation on phosphate deficient soil types indicates that the manurial response obtained from the first crop can be equal to that produced by superphosphates. On laterites of only slightly acid reaction the response amounts to 60% of that given by superphosphate, but the residual effects are high.

COLORIMETRIC METHODS OF ANALYSIS

249. Colorimetric methods of estimating sugars in plant material and potash were critically examined with a view to introducing such methods into laboratory routine.

SURVEYS

250. Progress was made on several centres with surveys, based on topographical, ecological and soil features, which it is believed will make possible the optimum use of each acre of land on the centres.

METEOROLOGY

251. New observatories were set up at Hope and Orange River Agricultural Stations and the collection of meteorological data by the Department in general reorganised in co-operation with the Meteorological Office stationed in Jamaica by the Air Ministry.

4. ANIMAL HUSBANDRY

Disease Control

FIELD OPERATIONS

252. *General* The Veterinary Division continued its preventative vaccination against Anthrax, Blackleg and Swine Fever. Some 9,000 animals for over 1,300 owners were vaccinated under this scheme.

253. *Anthrax* There were 22 suspected cases of Anthrax, none of which was positive. The Division vaccinated some 2,767 head of stock during the year against this disease.

254. *Swine Fever* Only two positive cases were diagnosed out of 33 suspected cases. Some 3,139 pigs for over 331 owners were vaccinated.

255. *Rabies* Rabies continues to be a sporadic disease of considerable menace although livestock owners are being encouraged to vaccinate regularly. The economic loss is being explained to these owners by the use of pamphlets on the subject.

256. *Tick Fevers* Tick fevers are still on the increase due to irregular supplies of materials, apparent lack of interest on the part of cattle owners and [illegible] supply of [illegible] materials. Large-scale surveys cannot be made at present due to lack of staff.

257. *Helminthiasis* This continues to be one of the worst enemies of stock and can receive only scant attention due to lack of staff.

258. *Anaplasmosis* A large number of cases of *Anaplasmosis* have arisen at the Hope Agricultural Station due to the necessary purchase of outside fodder.

259. *Contagious Abortion* A survey was made for Contagious Abortion at Hope and some 28% of the animals reacted to the test. A calf-hood vaccination scheme is in process.

260. *Poultry Diseases* Advice and assistance are still being given to the increasing number of poultry keepers as far as is possible. The diseases met with are mainly Fowl Cholera and Fowl Pox.

261. *Bee Diseases* A large outbreak of Foul Brood disease in November was combated in co-operation with the Jamaica Agricultural Society. This section of the work has since been transferred to the Entomological Division.

RESEARCH

262. Laboratory service in connection with diagnosis of poultry disease is being maintained although this is being superseded by diagnostic work on larger domestic animals.

263. A considerable increase was experienced in routine testing and diagnostic work during the year.

264. Experiments have been conducted in the year with *Phenothiazine, Stilboestrol Dipropinate, Sulvetil* and *Ty-Sin.*

Animal Husbandry

LIVESTOCK IMPROVEMENT CENTRES

265. During the year fifty fully equipped livestock improvement centres were in operation throughout the Island. The number of services given totalled 12,068. This number was made up as follows:—

133 services by jacks
3,850 services by bulls
5,438 services by ram goats
109 services by ram sheep
2,538 services by boars.

The interest in the livestock improvement centres is still being maintained.

SUBSIDIZED SIRES

266. Under the scheme of subsidizing privately owned sires for service, 1,968 services were given:—

8 by a jack
280 by bulls
1,203 by rams
477 by boars.

It is proposed to extend this service in future.

HOPE AGRICULTURAL STATION

267. Decision to effect drastic reduction in herd numbers at the Hope Agricultural Station was not put into full effect until March, 1944.

268. None the less general rehabilitation work combined with steady reduction of the herd has resulted in the Hope Agricultural Station being now put in a position where it can under normal conditions be completely self sufficient as far as fodder and pasturage are concerned while adequate nutrition of all animals is now a practical possibility.

269. Milk production at this station during the year totalled 188,402 quarts averaging 4.0 quarts of 4.4% milk per cow per day.

270. Sales and transfers totalled 359 animals. Most of these were sent to Government operated centres.

GROVE PLACE AGRICULTURAL STATION

271. *Cattle* The policy of grading up two herds by the use of purebred Jersey and Guernsey bulls was continued.

272. The herd has been [illegible] by transfers to Oxford where ample pasturage exists and improvement of Grove Place pastures is planned.

273. *Pigs* The production of Canadian Berkshires and Tamworths continued despite difficulties of feeding. The chief drawback is the shortage of skim milk and other forms of animal protein. The inevitable unbalanced ration (consisting of coconut meal and corn) was probably responsible for heavy mortality in the young pigs soon after birth.

274. Pasturage has been increased by the enclosure of four acres of citrus orchard.

275. [illegible] pigs [illegible] were lost to kidney and heart disease, the cause of which is obscure.

276. Tamworths have proven very hardy, but are somewhat inferior to Berkshires in rate of development. The public is prejudiced against them on account of their colour and length of legs and head. A few cross breds—Tamworth x Berkshire— have been produced, which are quite promising.

277. Calves have a great deal of trouble during the drought. There is need of a specific to control these fleas. They subside in wet weather.

278. *Stud Section* The sires were in fair demand. The thoroughbred stallion was stationed at Southfield in St. Elizabeth at a reduced fee. He returned to Grove Place in an emaciated condition. In view of this and his age, he was subsequently destroyed by the Veterinary Officer.

279. **In order to guard against the introduction of diseases by visiting stock, it has been decided that in future visiting stock shall be segregated from the Farm animals, and pasturage for lengthy periods will no longer be allowed.**

AGRICULTURAL CENTRES

280. *Dairy Cattle* Milk sheds and other dairy buildings some based on original designs were completed or in course of construction on several centres, notably Twickenham Park, where a Holstein herd was started, Caenwood, and Windsor for which Guernseys were obtained and Dover and Nutfield to which Montgomery-Jersey bulls were sent to start foundation herds. The Holstein and Guernsey cattle were supplied from the Department's herd at Hope.

281 *Beef Cattle* The herd at Nutfield was maintained and new bulls purchased, and another herd started at New Ground with surplus stock from Nutfield.

282. *Pigs* Large scale pig farms were developed at Caenwood and at Windsor and Seaman's Valley with both Berkshires and Tamworths and a few pigs were established on other centres. Feeding in all cases was initially based on waste crop products grown on the centres, but this has not proved satisfactory even for pigs kept under semi-free-range conditions, and trials have been designed to determine if growth rates can be increased by adding small quantities of concentrated feeds high in protein and bone meal to the local diet.

283. *Poultry* Brooder and laying houses were designed and erected at Twickenham Park and 1,400 day old chicks were imported from the U.S.A., the breeds being White Leghorn, Rhode Island Red and New Hampshire. Early results obtained in these houses and with feeds grown and prepared on the centre have been satisfactory. A breeding pen of Pekin ducks was also established at Windsor and Seaman's Valley, but difficulty has so far been experienced in obtaining a reasonable percentage of fertile eggs.

IMPORTATIONS

284. **During the year the following importations of livestock by the Department were made:—**

Cattle from Canda

2 Aberdeen Angus bulls
3 Aberdeen Angus females
1 Holstein bull.

285. **The total importations of livestock into the Island during the year were as follows:—**

5 goats from Cayman
6 goats from Canada
3 cows from Cayman
7 horses from Cayman
2 pedigree cattle from U.S.A.
8 pedigree cattle from Canada.

PASTURES

286. *Weed Control* Experimentation on the control of Piano Grass (*Themeda arguens*) as a weed in pastures has been continued.

287. Four plots, each of the following grasses:— *Botryochola*, Guatemala, Seymour, *Amphilophis*, Molasses, Panicum, Swaziland Finger, Elephant, Rhodes and Guinea, have now been established at Wales, Good Hope, Trelawny, with the object of ascertaining the possibilites of eradication of this grass by natural control. *Themeda arguens* is spreading rapidly in the Western Division and unless some means of control or eradication is discovered, it will prove a handicap to the development of livestock.

Improvement of Marketing of Animals and Animal Products

288. **The Livestock Clearing House which was established late in 1942 has now been operating for two years and has proved a valuable agency for the handling of livestock coming to Kingston, the biggest market in the Island.**

289. **The operation of the Clearing House is under the Advisory Committee on Livestock and Meat Control.**

290. **The number of animals handled during the year under review was as follows:—**

	No. of Head	Warm dressed wt. lbs.	Avg. weight per carcass dressed. lbs.
Cattle	5,224	2,937,486	562
Pigs	9,493	1,307,396	136
Goats	5,949	280,377	47
Sheep	1,393	112,229	81

291. The licensing of butchers was also continued and 2,201 licences were granted, of which number, 522 were general licences for the slaughter of all classes of stock, while 1,679 licences were granted for the slaughter of small stock.

292. There was no change in the price of butcher stock during the year, the following prices being paid:—

293. *Beef Cattle* The maximum selling price for cattle for beef was:—

(a) Where sold to the Clearing House—
Grade A—65/- per 100 lbs.
Grade B—60/- per 100 lbs.
Grade C—55/- per 100 lbs.
} Delivered at the Clearing House.

(b) Where sold other than to the Clearing House:—
Grade A—57/6 per 100 lbs.
Grade B—55/- per 100 lbs.
Grade C—50/- per 100 lbs.
} On the property of the vendor or where the cattle is to be slaughtered at any Slaughter House delivered at such Slaughter House.

(c) The dead dressed carcass selling weight for beef cattle was 60/- per 100 lbs. delivered at the Clearing House, 55/- per 100 lbs. where sold other than to the Clearing House.

294. *Pigs* The maximum selling price of pigs for slaughter was:—
(a) Where sold to the Clearing House —46/6 per 100lbs. live weight.
(b) Where sold other than to the Clearing House—
(i) 38/6 per 100 lbs. live weight.
(ii) 55/- per 100 lbs. dressed weight.

295. *Goats* The maximum selling price of goats for slaughter was:—
(a) Where sold to the Clearing House—5d. per lb. live weight.
(b) Where sold other than to the Clearing House—4d. per lb. live weight.

296. *Sheep* The maximum selling price of sheep for slaughter was:—
(a) Where sold to the Clearing House —6d. per lb. live weight.
(b) Where sold other than to the Clearing House—5d. per lb. live weight.

5. PUBLIC GARDENS

Hope Gardens

297. *Rainfall* **The total rainfall for the year was 33.59 inches.**

298. *Extension to Gardens* The Gardens have been extended by approximately 12 acres of land to the north and this is being laid out in lawns and shrubberies.

299. *The Maze* A Maze of 127 square feet has been formed on a site to the north of the Tourist Rest.

300. *Hibiscus* Selected varieties of Hibiscus have been planted in a formal layout of beds along the western boundary of the gardens.

301. *Flower Garden* The flower garden has been enlarged 100%.

302. *Shrubberies and Borders* The shrubberies and borders were maintained throughout the year with an attractive floral display of annuals, perennials and tropical flowering shrubs. A new shrubbery has been laid out along the eastern boundary of the gardens.

303. *Orchids* During the year 4,362 blooms of Cattleyas and hybrid Cattleyas were displayed in the orchid house. A number of blooms were cross pollinated with the object of raising some more seedling orchids by the asymbiotic method of germination.

304. *Cactus Garden* The collection of cacti was enlarged by the introduction of new species.

305. *Band Concerts* Regular band concerts were arranged by the Jamaica Military Band on the 1st and 3rd Sundays of the month.

306. *Visitors*—His Excellency the Governor, Sir John Huggins and Lady Huggins; Mrs. Eleanor Roosevelt, wife of the President of the United States of America and Brigadier General Tabernilla, Inspector General of the Cuban Army were among the distinguished visitors who visited the gardens during the year.

307. *Special Visits* Visits were made by the Superintendent to the Bath Botanical Gardens; the Royal Naval Air Station, Palisadoes; the German Internment Camps at Up-Park Camp and at Mona, to advise on horticultural matters.

308. *Routine Work* The routine work of the maintenance of the gardens and the propagation and distribution of nursery stock was regularly attended to.

309. *Distribution of Plants* A total of 61,749 plants was distributed during the year under review; of this number 48,993 were sold and 12,856 were free grants. Of the free grants 316 ornamental flowering trees were distributed to secondary and elementary schools for planting on Empire Day.

310. *Sale of Plants* The total amount for plants sold during the year was £689 7s. 0d., an increase of £200 17s. 0d. on the previous year.

Castleton Gardens

311. *Rainfall* The total rainfall for the year was 121.14 inches.
312. *General* The gardens were maintained in a satisfactory condition.
313. *Distribution of Plants* A total of 530 plants was sold during the year and 6,407 plants were transferred to Hope Gardens. The total amount for plants sold was £7 17s. 0d.

Public Gardens, Kingston

314. *Rainfall* The total rainfall for the year was 24.37 inches. No rain fell in the first 3 months of 1944.
315. *General* The routine work of maintaining the Kingston Public Gardens was regularly attended to. The use of water was prohibited owing to the prolonged drought, with the result that the gardens were drought-stricken for many months.

Hill Gardens, Cinchona

316. *Rainfall* The total rainfall for the year was 81.74 inches.
317. *Flower Beds* Flower beds of a new design were laid out on the terrace lawns.
318. *Leucadendron argenteum* Four plants of *Leucadendron argenteum* have been planted in the shrubbery below the terrace lawns.
319. *Visits* Regular visits of inspection were made by the Superintendent of Public Gardens to the Hill Gardens.

Bath Gardens

320. The Superintendent of Public Gardens visited the Bath Gardens on one occasion during the year and found the maintenance satisfactory

Gordon Town Gardens

321. The small garden at Gordon Town was maintained out of the Public Gardens maintenance vote.

King's House Garden

322. *Rainfall* The total rainfall for the year was 35.47 inches.
323. *Flower Garden* New plants including 12 plants of the White Bougainvillea were planted in the flower garden.
324. *Ficus repens* Concrete boxes were built on the side of the walls of King's House and *Ficus repens* planted in them.
325. *Kitchen Garden* The kitchen garden was extended by two square chains on the eastern boundary.
326. *General* The routine work was regularly attended to by the garden staff.

6. AGRICULTURAL EDUCATION

Jamaica School of Agriculture

327. *Enrolment* Enrolment during the year averaged 66 students including one special student from Turks Island. Twenty-eight of these were recipients of scholarships.
328. *New Students* Fifty-four candidates sat at the Entrance Examination held in August. There were thirteen vacancies available.
329. *Graduation* The annual graduation was held on the 8th July. The Hon. H. H. Croucher, Acting Director of Agriculture presided, and diplomas in Practical Agriculture were presented to twenty students by the Hon. R. B. Barker.
330. *Health of Students* The health of the students has been good throughout the year.
Several students showed signs of anaemia which on test proved to be the result of hookworm. They were effectively treated by the Medical Officer of the school.
331. *Scholastic Work* There were no changes in the curriculum but Farm Management was included in the syllabus for the Third Year Students.
Several educational tours were conducted for the senior students to various estates, factories and agricultural training centres throughout the Island.
332. *Non-scholastic Activities* The branch of the Student Christian Movement has been active under the guidance of Mr. Harry Edwards, Secretary of the Jamaica Y.M.C.A.
The School entered teams in the Evelyn Cricket Cup Competition and the Junior League and Senior Knock-out Football Competitions.
333. *Advisory Board* No meeting of the Board was held during the year.

Agricultural Stations

334. Agricultural Instructors from the Jamaica Agricultural Society were stationed at each of the agricultural stations for a period of not less than six months to undergo training.
A small library has been started at each station.

Field Days

335. During the year forty-four livestock field days were held, being one at each of the livestock improvement centres and two meetings on land settlements. At these meetings the total attendance was 3,603 persons. The programme included demonstrations and discussions on the breeding, feeding and management of all classes of livestock. Special emphasis was laid on the various problems in connection with livestock in the district in which such meetings were held. In some cases shows were held in connection with the livestock field day, special emphasis being laid on the progeny sired by sires at the livestock improvement centres.
336. Field days were also arranged at the Orange River Station for several branches of the Jamaica Agricultural Society. There has been a welcome increase in interest on the part of the officers of the Society in the experimental work in progress.
337. Two half-yearly meetings of the St. Mary Branches Associated were held at this station.

Broadcasts

338. The Superintendent of Public Gardens gave a series of monthly talks entitled "In your garden next month" from ZQI, the local Broadcasting Station, and the Senior Botanist gave two broadcasts on botanical subjects of popular interest.

7. PUBLICATIONS

339. A pamphlet on "Diseases of Coconuts in Jamaica" by E. B. Martyn, Plant Pathologist, was published by the Jamaica Agricultural Society.
340. "A Preliminary List of Plant Diseases in Jamaica" by L. N. H. Larter, Botanist, and E. B. Martyn, Plant Pathologist, was published by the Imperial Mycological Institute as Mycological Paper No. 8.

SECTION III—LEGISLATION

341. The following laws relating to agriculture were passed during the year:—

No. 1943	Date Assented to	Short Title	Chief Provisions
14	21.4.43	The Jamaica Agricultural Society Incorporation (Amendment) Law, 1943	To permit the Board to make rules for the establishment of a provident fund for the benefit of the officers and servants of the Society.
*22	8.6.43	The Animals (Diseases and Importation) Law, 1943	To prevent and control the existence and spread of animal diseases by (a) providing for the notification, movement and destruction of animals, in the Island which are diseased or suspected of being diseased; (b) regulating the importation of animals into the Island.

* To come into force on a date to be proclaimed.

H. H. Croucher,
Acting Director of Agriculture.

Kingston, Jamaica.
November 11, 1944.

APPENDIX I

AGRICULTURE IN THE TURKS AND CAICOS ISLANDS

1. During the year there was a change of officer. Mr. H. T. Carrington was relieved on the 1st of July, 1943.

2. *Weather Conditions* During the year 44.46 inches of rain were registered.

3. *Crop Conditions* Owing to the irregularity of the rainfall during the summer months no crop was made throughout the Caicos Islands. There was a very good winter crop of corn. A vegetable growing campaign was started in the Kew and Bottle Creek Settlements. Nearly £10 of seeds consisting of cabbages, onions, turnips and carrots were sold throughout these settlements. Instructions and practical demonstrations in the sowing of seeds and the culture of these vegetables were given and a very excellent crop was made. Thousands of pounds of vegetables were sold to the Salt Islands. This greatly augmented the very poor existing food situation of the Islands.

4. *School Gardens* The school gardens at Kew and Bottle Creek were properly laid out on lines similar to school gardens in Jamaica and very good crops of corn and vegetables were reaped. Both children and teachers are taking very keen interest in this work.

5. *Demonstration Farm.* A demonstration farm consisting of approximately 50 acres was established at Kew to serve as an agricultural base for the Caicos Islands.

The planting of crops adaptable to the Caicos Islands was demonstrated along the right lines particular attention being paid to the application of farmyard manure and of mulching. Plants of Uba cane, Bombay mangoes, different varieties of cassava, avocado pear, breadfruit and pineapple were imported from Jamaica and established on the farm. Seeds of the Red pea variety and the Dwarf Guinea corn were also imported. It is expected that in the future plants and seeds from these crops will be distributed throughout the Caicos Islands. All these plants are making satisfactory progress.

Sixteen acres of Guinea Grass pastures were also established for the rearing of livestock in the future.

6. *Training of Lads* During the year two lads were sent from the Caicos Islands to the Holmwood Practical Training Centre in Jamaica for agricultural training. Two apprentices were also taken on at the demonstration farm.

7. *Agricultural Demonstrator* The Agricultural Demonstrator who was sent for training at the Holmwood Practical Training Centre arrived and assumed duties during the month of October, 1943.

8. *General Conditions* A new interest is being taken by the people of the Caicos Islands in the improved methods of agriculture. A holding-improvement campaign was started in the Kew and Bottle Creek Settlements and nearly every holding was cleared of stumps and stones and crops planted on these along the right lines. Necessary tools for this work were imported and sold at cost price. In some instances tools for the demonstration farm work were loaned.

A number of wells were sunk on holdings to assist in the growing of vegetables during the dry periods.

10. *Agricultural Scheme* A scheme of agriculture to improve existing agricultural conditions in the Turks and Caicos Islands was drafted and submitted through the Commissioner to the Comptroller for the Development and Welfare of the West Indies for his approval.

C. A. Long,
Agricultural Officer.

APPENDIX II

SUGAR CONTROL BOARD

ANNUAL REPORT 1943-44

PRODUCTION

Production of sugar in the 1943 crop exceeded production in the previous year, and was nearly as great as that of 1941, which was a record crop. The production figures for the 1943 crop are as follows:—

Total production	165,670 tons
Sugar exported	144,837 "
Local consumption	18,512 "
Muscovado production	Nil
On hand for export at end of quota year ..	64,123 tons

The whole of the 1943 crop production of sugar exclusive of that required for local consumption was purchased by the Imperial Government. 27 factories operated.

2. The total number of registered cane farmers at the end of the 1942-43 quota year amounted to 8,939. 8,709 of these farmers delivered sugar cane which amounted to 37% of the total cane milled. The Island average tons cane per ton commercial sugar was 9.52. Cane production for the years 1939 to 1943 inclusive is as follows:—

	Estate Canes	Farmers Canes	Total Canes Ground
1939 --	790,245 tons	270,823 tons	1,061,068 tons
1940 --	726,804 "	244,118 "	970,922 "
1941	1,059,930 "	538,159 "	1,598,089 "
1942 --	981,078 "	604,238 "	1,585,078 "
1943	991,824 "	590,639 "	1,582,463 "

POLICY FOR FUTURE SUGAR PRODUCTION

3. The position in regard to exports of sugar was reviewed by the Imperial Government in January, 1944. His Majesty's Government authorized the Ministry of Food to undertake to purchase, each year up to and including 1946, a tonnage of sugar equal to to that actually exported in 1943 plus an increase of 20%, provided the Colony would undertake to make all such sugar available to the Ministry.

PREFERENCE CERTIFICATES

4. The question of Preference Certificates was again reviewed. The Imperial Government undertook to allow each Colony, for the financial year 1944-45 and subsequent years until further notice, a number of certificates equal to one-third of its average exports of sugar, taken to the nearest hundred tons, during the three calendar years immediately previous to the commencement of the financial year. The average of the three years preceding the 1944-45 financial year was reported to the Secretary of State, who approved of the allocation of 451 Preference Certificates to Jamaica for the period.

REGISTRATION OF CANE FARMERS

5. During the greater part of the year registration of cane farmers continued to be restricted to those farmers who had previously delivered through registered farmers, provided the registered farmer would release in favour of the unregistered, the amount he previously delivered on his behalf. In January, 1944, following on the instructions from the Secretary of State that the Imperial Government would purchase from Jamaica each year up to 1946, a tonnage of sugar equal to that exported in 1943 plus an increase of 20%, restriction of registration of cane farmers was relaxed, and the registration of new farmers was resumed in cases where the factory recommended the registration, provided the cultivations of the farmers recommended were considered to be situated at an economic distance from the factory. Distances under ten miles were taken to be economic. The registration of farmers whose cultivations were situated at more than ten miles from the factory were considered on the merits of each case, as special circumstances might render longer distances economic. The question of the registration of new farmers at Sevens Factory was deferred until the whole question of cane production in that area, with relation to the factory capacity and the economic production of cane could be reviewed. On the application of the factory in June 1943, and the recommendation of the Sugar Control Board, an Order was made by the Governor in Privy Council approving of special licensing of cane farmers at this factory for the 1945 crop.

FACTORIES

6. The owner of Retreat Factory notified the Board of his intention not to operate that factory in the 1944 crop. He applied for registration as a cane supplier to The West Indies Sugar Co., Ltd. at Frome, and recommended the transfer to Frome of the registrations of the farmers then registered at Retreat. Following consultation with the farmers, the registration and transfers were effected, and the Retreat Quota for sugar production amalgamated with that of Frome. Retreat Factory was not, however, removed from the Schedule of Factories under the Law.

CANE PRICES

7. A simple formula was prepared by the Sugar Manufacturers' Association and approved by the Cane Farmers Association and the Sugar Control Board for applying the general formula under the Sugar Cane (Minimum) Price Orders 1942 and 1943 to the deliveries made by individual farmers or groups of farmers.

8. As a result of an enquiry into the price of cane conducted in the previous year, and to facilitate the more accurate calculation of payments to cane farmers, sugar manufacturers had been urged to adopt a uniform system of accounting. The Sugar Manufacturers' Association, after thorough investigation, developed a standard system of accounting, which was adopted by 17 of the 27 factories in the 1943 crop. Four more undertook to adopt the system in the 1944 crop and the remaining five factories, which were not permitted by their Head Offices abroad to change their accounting systems undertook to supply statements as required in accordance with the standard system. One factory had no cane farmers, and was not required to adopt the system.

CESS

9. The Sugar Control Board collected the cess on behalf of Government for payment to the All-Island Jamaica Cane Farmers Association. The amount of the cess was fixed at one penny per ton cane purchased.

SCALES

10. The registration of scales used in the purchase of sugar cane was continued under the Law and new certificates issued for scales replaced. A total of 91 scales have been registered up to the 31st March, 1944. Scales were inspected by the Police.

STATISTICS

11. Statistical information has been supplied during the year to the Labour and Agricultural Departments, the Sugar Manufacturers' Association and certain individuals.

Attendance at Meetings	No. of Meetings
The Director of Agriculture* (Hon. G. A. Jones) (Chairman)	1
Hon. R. B. Barker (Vice-Chairman)	7
Hon. A. B. Lowe	6
Mr. J. G. Kieffer	5
Mr. U. Theo. McKay	7
Mr. P. E. N. Mortimer	4
Mr. D. J. Verity	7
Mr. J. A. Tannock	6
Mr. H. H. Croucher (Secretary)	7

* Absent on leave. Chair taken by Hon. R. B. Barker or by Hon. H. H. Croucher in Director of Agriculture's absence.

H. H. CROUCHER,
Actg. Chairman.